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**Review**

# Fish as medicine: indigenous traditional knowledge and practices in Northeast India

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**Abstract**
Northeast India, often referred to as the bio-geographical gateway of the country. It is home to rich biodiversity and diverse indigenous communities with deep-rooted traditional knowledge systems. Among these, ichthyofauna plays a pivotal role in ethnomedicinal practices, reflecting the intricate relationship between humans and their environment. This study aims to document and analyse the therapeutic applications of fish species traditionally used for healthcare in Northeast India. Through the PRISMA method, we identified and selected 21 articles reporting the use of fish as ethnomedicine in Northeast India. A total of 70 fish species from 27 families were identified, including *Channa punctata* and *Monopterus cuchia*, which are commonly used for respiratory and gastrointestinal ailments. Findings reveal that fish-based remedies are deeply integrated into the cultural and spiritual beliefs of local communities, emphasizing a holistic approach to health. This study highlights the potential of integrating traditional ichthyotherapeutic knowledge with modern medicine to create sustainable and culturally appropriate healthcare solutions. Furthermore, it underscores the importance of preserving this indigenous knowledge for future generations while ensuring ecological sustainability.

**Keywords:** biodiversity conservation; ethnomedicine; ichthyofauna; Northeast India; traditional healing; zoo-therapy

## 1 | INTRODUCTION

Biodiversity hotspots around the world harbor not only unique flora and fauna but also deep reservoirs of indigenous knowledge systems (Hassan *et al*. 2022). Across these landscapes, indigenous communities have historically depended on their natural environments to develop complex ethnomedicinal remedies that integrate cultural beliefs with empirical observations (Mahugnon 2022). Among these natural remedies, ichthyofauna hold significant importance. Thus, the indigenous communities utilize these resources to treat a variety of ailments, demonstrating their profound understanding of local ecosystems and the therapeutic properties. Such practices align with global traditions of animal-based medicine, which emphasize the therapeutic potential of ichthyofauna (Alves and Rosa 2005). Ethnomedicine refers to the use of natural resources, including plants and animals, to treat various health conditions based on indigenous knowledge systems. Zootherapy refers to the treatment of human disorders by therapies derived from animal-based medicine (Jaroli *et al*. 2010). The discipline concerned with the therapeutic application of fish in human healthcare is

termed ethnoichthyology (Vallejo and Gonzalez 2014).

In this perspective, ethnoichthyology represents a significant yet understudied component of ethnomedicine in Northeast India. This region is recognized for its high species diversity, ecological heterogeneity, and cultural complexity (Basumatary *et al*. 2023). Of particular significance are the diverse aquatic ecosystems that traverse the region. Major river systems such as the Brahmaputra and Barak, along with numerous tributaries, hill streams, lakes, and seasonal wetlands, provide habitats for an extensive array of freshwater ichthyofauna (Borah and Prasad 2017). This aquatic biodiversity not only sustains local livelihoods through fishing and aquaculture but also supports traditional healthcare practices passed down through generations (Deb and Haque 2011; Chinlampianga *et al*. 2013). Numerous ethnic groups, including the Bodo, Karbi, Naga, Mising, and Dimasa communities, employ a variety of fish species to treat diverse health conditions ranging from respiratory disorders and gastrointestinal problems to dermatological infections and blood-related ailments (Jamir and Lal 2005; Teronpi *et al*. 2012; Paul 2018; Basumatary *et al*. 2023). Species belonging to families such as Cyprinidae, Channidae, Clariidae, and Mastacembelidae are commonly utilised and believed to possess specific therapeutic properties. Remedies are often prepared by using specific parts of the fish, such as skin, flesh, blood, bile, oil, and mucus. For instance, the snakehead fish *Channa punctata* is traditionally used for its anti-inflammatory and bronchodilatory properties, while the freshwater eel *Monopterus cuchia* is valued for its reputed efficacy in treating asthma through the consumption of its blood (Kakati *et al*. 2006; Devi *et al*. 2015). Beyond their medicinal roles, many fish-based therapies are closely intertwined with ritualistic or symbolic practices, underscoring their significance in maintaining cultural identity and reinforcing community beliefs related to health and spirituality.

The scientific validation of traditional ichthyotherapeutic practices represents another critical frontier. While these practices are deeply rooted in empirical observations and cultural beliefs, modern pharmacological studies have yet to fully explore the bioactive compounds present in medicinal fish species. Understanding the biochemical basis of these remedies could pave the way for their integration into contemporary healthcare systems (Sonar *et al*. 2025). Fish have antioxidant and bioactive properties like proteins, lipids, minerals, and vitamins, which serve as an essential component of modern drugs used for disease prevention and treatment of hypertension, asthma, cardiovascular disorders, cancer, inflammatory disorders, and diabetes (Awuchi *et al*. 2022). For instance, certain compounds found in fish tissues, such as omega-3 fatty acids, proteins, and peptides, are already known for their health benefits (Usydus and Szlinder-Richert 2012). Further research may reveal additional bioactive molecules with potential applications in treating chronic diseases, infections, and other medical conditions.

The need for a comprehensive assessment of ichthyotherapeutic practices is further underscored by increasing environmental and socio-economic pressures. Rapid habitat degradation, overfishing, pollution, and climate-induced ecosystem alterations are threatening freshwater biodiversity in Northeast India (Das 2015). Concurrently, shifts in cultural practices, changing livelihood patterns, and reduced intergenerational transmission of oral knowledge systems contribute to the gradual erosion of indigenous ethnomedicinal wisdom (Mihsill and Keshan 2017). These combined pressures pose risks not only to biological resources but also to the cultural heritage and healthcare resilience of indigenous communities, many of whom depend on traditional remedies due to limited access to modern healthcare facilities (Jugli *et al*. 2020).

This study aims to document ichthyotherapeutic practices, assess their cultural significance, and explore their pharmacological potential. The findings are expected to contribute to biodiversity conservation, promote sustainable use of aquatic resources, and support the scientific validation of traditional remedies with potential applications in modern medicine. Ultimately, it aims to honour indigenous wisdom and contribute to healthcare innovation and biodiversity conservation through systematic documentation and scientific inquiry.

## 2 | METHODOLOGY

### 2.1 Study area

This study encompassed the seven states of Northeast, which include Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, and Tripura (Figure 1). These regions were chosen due to their rich biodiversity, cultural diversity, and the prevalent use of traditional medicinal practices involving ichthyofauna. Geographically, Northeast India is situated between approximately 29.45°N and 22.00°N latitude and 97.50°E and 89.78°E longitude. The Brahmaputra, Chindwin, and Barak are river systems along with their wetlands and aquatic ecosystems, that offer vital habitats for a wide range of fish species, making it an ideal setting for exploring ethnomedicinal practices.

### 2.2 Data sources and literature search

For the systematic literature review, we used the Preferred Reporting Items for Systematic reviews and Meta-analyses (PRISMA) to guide the review process (Figure 2). We searched for published literature using the following keywords in the Scopus database: “ethnomedicine” OR “zootherapy”. Only the articles involving traditional knowledge about the uses of fish as ethnomedicine were considered. Furthermore, an additional search was per-

formed in the Web of Science database using the keywords “fish medicine” OR “traditional Knowledge” AND “Northeast India” OR “Assam” OR “Manipur” AND “anemia” OR “tonic”. Additional peer-reviewed articles were also considered for being part of the references that appeared in the searches. A study was selected only if it involved Medicinal applications of freshwater fish species in Northeast India, having preparation methods, cultural significance, or spiritual aspects of fish-based remedies. Publications spanning from 2002 to 2025 were reviewed to ensure a comprehensive understanding of the subject. These studies were considered as they were in line with the research aims.

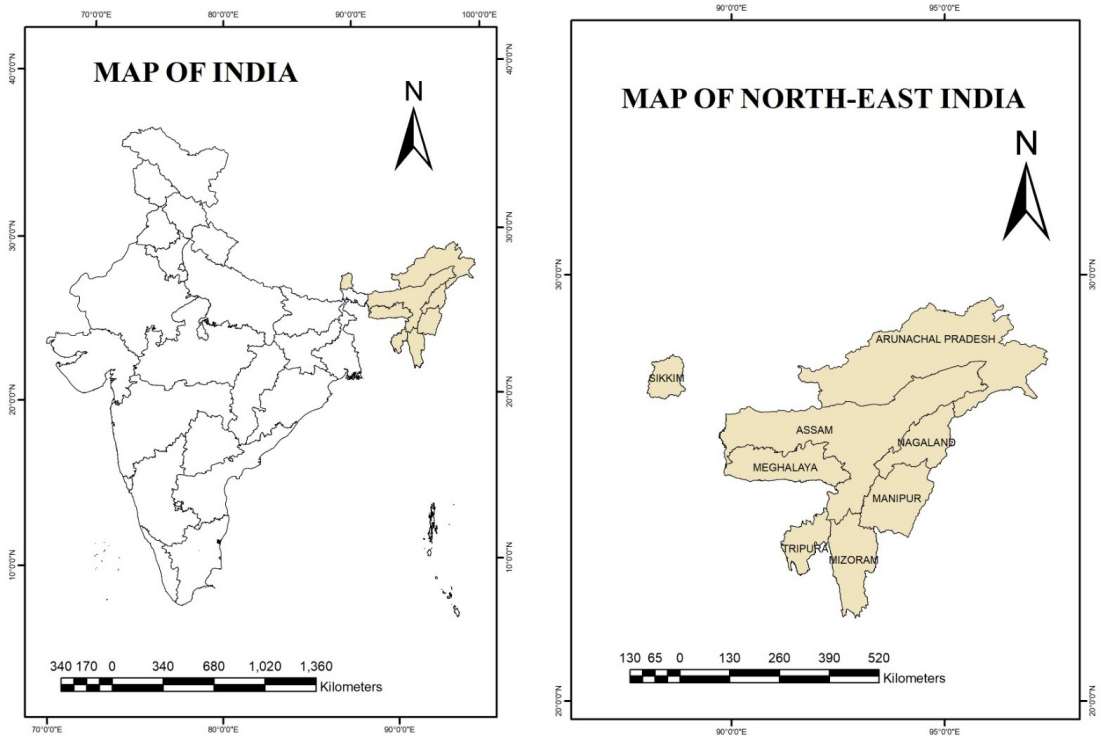


**FIGURE 1** Location map of Northeast India.

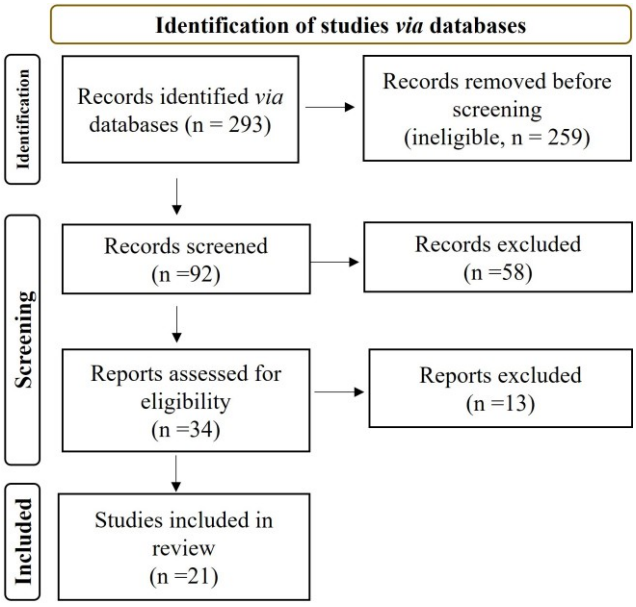


**FIGURE 2** PRISMA flow diagram illustrating the literature review process.

Initially, titles and abstracts of retrieved articles were screened to evaluate their focus on the medicinal use of fish in Northeast India. The number of publications decreased from 29 to 11 after screening using the first set of terms in Scopus. For the results of the Web of Science database search, the number of publications decreased from 180 to 3 after screening. Furthermore, the result for Google Scholar decreased from 84 to 7. The final analysis was performed using 21 publications. Additionally, 16 peer-reviewed articles were added, as those also reported on the use of fish for the treatment of disease and conservation of biodiversity.

## 3 | RESULTS

### 3.1 Fish species used in traditional medicine

The study identified 70 fish species from 27 families that are used for medicinal purposes across Northeast India (Tables 1–5). The majority of species belong to the Cyprinidae (22 species), Bagridae (7 species), and Channidae (6 species) families. Commonly used species included *Channa punctata* (spotted snakehead), *Monopterus cuchia* (cuchia eel), and *Labeo pangusia* (goonch fish), which were noted for their diverse therapeutic applications.

### 3.2 Therapeutic applications

The fish species documented in the study were used to address a variety of ailments, broadly categorized into the following groups:

#### 3.2.1 Respiratory disorders

Several fish species are utilized for treating respiratory ailments, including asthma, tuberculosis, and other chronic conditions. In Nagaland, *M. cuchia* is commonly used, with its blood consumed to clear respiratory passages. In Assam, *C. punctata* is prepared in a decoction with black pepper to treat tuberculosis. Similarly, the air bladder of *Wallago attu* is frequently used for its anti-inflammatory properties to alleviate asthma symptoms.

#### 3.2.2 Gastrointestinal disorders

*Labeo pangusia* and *Pethia manipurensis* are traditionally employed to address digestive problems, especially in postpartum women. These species are typically boiled and consumed to reduce abdominal pain, enhance digestion, and stimulate appetite. Fish bile from species like *Labeo rohita* is also used to treat gastric ulcers.

#### 3.2.3 Skin and wound care

Fish such as *Channa striata* (Striped Snakehead) and *Barbus* sp. are widely used for treating skin diseases and promoting wound healing. In Nagaland, the mucus of *Barbus* sp. is applied to chickenpox lesions to reduce itching and accelerate healing. Fish skin, valued for its collagen content, is used to promote tissue regeneration and reduce recovery time.

#### 3.2.4 Blood-related disorders

Fish species like *Monopterus albus* and *Amphipnous cuchia* are consumed for their perceived benefits in improving blood health, particularly for treating anemia. These species, known for their high iron content, are used to increase hemoglobin levels. Additionally, Puntius sp. is used as a blood purifier, reflecting its significant role in traditional healthcare.

### 3.3 Cultural and spiritual significance

In addition to their therapeutic roles, many fish species hold cultural and spiritual importance. For instance, *C. striata* is often used in spiritual rituals in Meghalaya, combining physical healing with ceremonies aimed at ensuring protection from negative energies. The integration of physical health with spiritual beliefs is a consistent theme throughout the region, with fish-based remedies often accompanied by prayers or rituals.

### 3.4 Sustainability and conservation concerns

The study highlighted the growing concerns about the sustainability of medicinal fish species. Overfishing, habitat destruction, and environmental changes have led to a noticeable decline in the availability of species like *C. punctata* and *M. cuchia*. Communities expressed concerns that these pressures could jeopardize traditional healing practices. Many respondents advocated for sustainable harvesting practices, the establishment of fish sanctuaries, and the creation of regulated fishing zones to ensure the long-term availability of these vital resources.

**TABLE 1** Ethnomedicinal use of fish species in Assam, India.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Amblypharyngodon mola* | Adjoining area of Gibbon Wildlife Sanctuary (Moa mas) | Whole fish | Asthma, pox, body pain | Prescribed to consume cooked fish. | 1 |
| | Adjoining Area of Pobitora Wildlife Sanctuary (Moa mas) | Whole fish | Premenstrual pain | Fish is boiled and prescribed for consumption. | 2 |
| | Bodo Tribe of Kokrajhar District (Moaya) | Flesh, head, whole fish | Anemia, eyesight problem, stomach ache | Boiled fish is consumed. | 3 |
| *Danio aequipinnatus* | Karbi Tribe of Karbi Anglong District (Nune) | Whole fish | Hypersalivation | Boiled fish is consumed regularly. | 4 |
| *Danio rerio* | Bodo Tribe of Kokrajhar District (Nijou) | Whole fish | Anemia | Cooked and consumed. | 3 |
| *Labeo gonius* | Bodo tribe of Kokrajhar District (Kursa) | Meat, head | Anti-allergy | Cooked and consumed. | 3 |
| | Mising Tribe of Dhemaji (Kuri) | Whole body | Allergy | Cooked with herbs and consumed. | 5 |
| *Labeo pangusia* | Karbi Tribe of Karbi Anglong District (Notun) | Flesh, bile | Postpartum weakness, stomach ache | Boiled fish is consumed regularly to regain strength. Bile is consumed to relieve stomach ache. | 4 |

**TABLE 1** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Labeo pangusia* | Dimasa tribe of Karbi Anglong District | Bile | Stomach ache | Bile is consumed. | 4 |
| *Labeo rohita* | Adjoining area of Gibbon Wildlife Sanctuary (Rou mas) | Bile | Gastric ulcer, intestinal cancer | Ground with water and prescribed to consume. | 1 |
| | Bodo Tribe of Kokrajhar District (Rohu) | Head, flesh, viscera, bile | Cardiovascular health, brain development, pain reliever | Cooked and consumed. Bile is applied for pain relief. | 3 |
| *Puntius sarana* | Bodo Tribe of Kokrajhar District (Pitikri) | Meat | Eyesight problem | Good for eyesight. | 3 |
| *Puntius sophore* | Bodo Tribe of Kokrajhar District | Alimentary canal, bile | Relieve pain caused by *Heteropneustes fossilis* sting | - | 3 |
| *Puntius* sp. | Karbi Tribe of Karbi Anglong District (Ok-puthi) | Whole fish, head | Blood purifier, common cold, night blindness | Manthu cooked with bamboo shoot is consumed to purify the blood. Manthu cooked with chilli is consumed to cure common cold. Cooked head is consumed regularly for treatment of night blindness. | 4 |
| | Thadou Tribe in Karbi Anglong District (Puthi) | Head | Memory booster | Boiled and consumed. | 4 |
| | Deori Tribe of Dhemaji District | Whole body | Eyes problem | Fish is cooked and consumed. | 6 |
| *Rasbora daniconius* | Jorhat (Dorikona) | Whole fish | For good eyesight. | Steamed fishes in the leaves of *Alpinia allughas* are given. | 7 |
| *Rasbora* sp. | Bodo Tribe of Kokrajhar District (Maoya) | Flesh, head | Eyesight, brain development | Cooked and consumed. | 3 |
| *Mystus carcio* | Bodo Tribe of Kokhrajhar District (Tengwna) | Meat | General weakness | Dry or raw fish cooked with vegetables and medicinal plants, consumed to regain strength after illness. | 3 |
| *Mystus* sp. | Karbi Tribe of Karbi Anglong District (Tengera) | Whole fish | Small pox | Cooked fish is consumed. | 4 |
| *Mystus tengara* | Bodo Tribe of Kokhrajhar District (Tengwna) | Meat | General weakness | Cooked with vegetables and medicinal plants and consumed. | 3 |
| *Channa gachua* | Adjoining area of Pobitora Wildlife Sanctuary (Cheng mas) | Whole fish | Abdominal pain | Boiled and consumed. | 2 |
| | Karbi Tribe of Karbi Anglong District (Ok-langos) | Bile | When pricked by thorn | Bile is applied to the wound area. | 4 |
| | Dimasa Tribe in Karbi Anglong District | Whole fish | Dysentery | Fish is mixed with common salt and wrapped in banana leaf, boiled and consumed. | 4 |
| | Bodo tribe of Kokrajhar District (Nasrai, Nisla) | Meat, head | Promote lactation in mothers, improve bone health, relieves joint pain, arthritis | Boiled with medicinal plants and consumed. | 3 |

**TABLE 1** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Channa gachua* | Deori Tribe of Dhemaji District | Whole body | Gall bladder stone | Flesh is cooked and consumed. | 6 |
| *Channa marulius* | Bodo Tribe of Kokrajhar District (Na Sal) | Meat, head, live fish | Cold, Fever, blood purification, increase in haemoglobin, induce walking in children | Cooked and consumed. It is traditionally believed that the 'beating' by the caudal fin of the live fish on the lower limbs of children induces walking in them (in case of delayed onset of walking in some children). | 3 |
| *Channa punctata* | Adjoining Areas of Pobitora Wildlife Sanctuary (Goroi) | Whole fish | Tuberculosis | Boiled with black pepper and consumed. | 2 |
| | Karbi Tribe of Karbi Anglong District (Ok- Meklot) | Eyes | Corns, clavus | Eye mixed with common salt is applied to affected area. | 4 |
| | Thadou Tribe of Karbi Anglong District (Ngavo- Whole Fish) (Thinkha- Bile) | Whole fish, head, bile | Diarrhea, swelling of the testicle, malaria | Fish is boiled and consumed. Head are tapped on the affected testicle to reduce swelling. Bile is taken thrice a day till recovery. | 4 |
| | Bodo Tribe of Kokrajhar (Nagwri) | Meat, brain, head | General weakness, cold, fever, blood purification, renal calculi | Cooked and consumed. Soup of grounded dry head part in water is drunk to treat renal calculi. | 3 |
| *Channa stewartii* | Adjoining Area of Gibbon Wildlife Sanctuary (Chengeli Mas) | Whole body | Diabetes, body pain, hypertension | Boiled and consumed. | 1 |
| *Channa striata* | Bodo Tribe of Kokrajhar (Sol) | Meat, head | Wound healing, blood purification, cold, fever | Cooked and consumed. | 3 |
| *Chanda nama* | Bodo Tribe of Kokrajhar (Chandanga) | Whole fish | General illness | Boiled and consumed to improve health. | 3 |
| *Parambassis lala* | Bodo Tribe of Kokrajhar (Chandanga) | Whole fish | General illness | Boiled and consumed to improve health. | 3 |
| *Parambassis ranga* | Bodo Tribe of Kokrajhar (Chandanga) | Whole fish | Cold, fever, general illness | Boiled and consumed. | 3 |
| *Macrognathus aral* | Bodo Tribe of Kokrajhar (Turi) | Meat | Cold, fever | Cooked and consumed. | 3 |
| *Macroganthus pancalus* | Bodo Tribe of Kokrajhar (Nathuri) | Head | Ingrown nails, cellulitis, anticancer | Roasted head grounded with snail flesh is applied to provide relief. It is also believed to have anticancer properties. | 3 |
| *Amphipnous cuchia* | Adjoining area of Gibbon Wildlife Sanctuary (Cuchia) | Whole body, blood | Anemia | Cooked meat is consumed, raw blood drunk. | 1 |
| | Adjoining area of Pobitora Wildlife Sanctuary (Cuch mas) | Whole fish, blood | Premenstrual abdominal pain, anemia | Boiled and consumed to relief pain. Raw blood is consumed for the treatment of anemia. | 2 |
| | Karbi Anglong District (Kumchirul) | Blood | Asthma, jaundice, general weakness | Raw blood consumed. | 8 |
| | Deori Tribe of Dhemaji District | Blood, whole body | Anemia, piles | Fresh blood is drunk to treat anemia. Flesh cooked with tuber *Lasia spinosa* are consumed for treating piles. | 6 |

**TABLE 1** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Monopterus cuchia* | Karbi tribe of Karbi Anglong District | Blood, whole fish | Anemia, kala-azar, entry of leech into the anus. | For the treatment of anemia and Kala-azar, raw fish is consumed and fresh blood is drunk. Fresh raw blood is consumed to remove leech from the rectum or anus. | 4 |
| | Dimasa Tribe of Karbi Anglong District (Namna) | Whole fish | Postpartum weakness | Fish is boiled and consumed to regain health. | 4 |
| | Bodo tribe of Kokrajhar (Cuchia) | Meat, blood, head | Anemia, stomach ache | Cooked with *Lippia geminate* and consumed to treat anemia. Dried head is roasted, ground and mixed with water and consumed to cure stomach ache. | 3 |
| *Anabas testudineus* | Adjoining Area of Pobitora Wildlife Sanctuary | Whole fish (Kaoi mas) | Dysmenorrhea | Head portion of the fish is boiled with *Borsassus flabellifer* leaf and chilli, consumed. | 2 |
| | Bodo tribe of Kokrajhar (Kaowi) | Meat | Cold, fever, jaundice, general illness | Meat is cooked and consumed. | 3 |
| *Anguilla bengalensis* | Karbi tribe of Karbi Anglong District (Nujung) | Fats | Rheumatoid arthritis | Fats applied topically. | 4 |
| | Bodo Tribe of Kokrajhar (Nangdor) | Meat, head | Piles, anticancer properties | Dry head roasted, mixed with mustard oil, applied. | 3 |
| *Anguilla* sp. | Mising tribe of Dhemaji | Blood | General weakness | Blood is mixed with turmeric and consumed. | 5 |
| *Clarias batrachus* | Adjoining area of Gibbon Wildlife Sanctuary (Magur mas) | Whole body | Body ache, wound healing | Cooked with spices like black pepper. | 1 |
| | Karbi tribe of Karbi Anglong District (Nagur) | Whole fish | Small pox | Fish cooked and consumed. | 4 |
| | Dimasa tribe of Karbi Anglong District (Nagen) | Whole fish | Postpartum weakness | Boiled fish consumed regularly. | 4 |
| *Clarias magur* | Bodo Tribe of Kokrajhar (Magur) | Meat | Anemia, digestion, immunity booster, general weakness | Boiled with medicinal plants and consumed. | 3 |
| | Karbi tribe of Karbi Anglong District (Nagur) | Whole fish | Small pox | Fish cooked and consumed. | 4 |
| | Dimasa tribe of Karbi Anglong District (Nagen) | Whole fish | Postpartum weakness | Boiled and consumed regularly. | 4 |
| | Tea Tribe | Whole fish | Body ache | Cooked with black pepper and consumed. | 9 |
| | Indigenous People | Whole fish | General weakness, chicken pox, measles | Soup prepared with *Piper nigrum* and *Spinacia oleracea* and consumed to regain health. Fried fish with processed bamboo shoot, Kharisha following specific recipe known as Hukoni is prescribed to cure measles and chicken pox. | 9 |

**TABLE 1** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Glossogobius giuris* | Bodo Tribe of Kokrajhar (Namutra) | Flesh, head | Nocturnal enuresis | Boiled or roasted fish is consumed. | 3 |
| *Glossogobius* sp. | Mising Tribe of Dhemaji | Flesh | Enuresis | Cooked and consumed. | 5 |
| *Chitala chitala* | Bodo tribe of Kokrajhar (Chital) | Scale | Anti-dandruff in babies | Dried scales are ground, mixed with coconut oil and applied. | 3 |
| *Notopterus notopterus* | Adjoining area of Pobitora Wildlife Sanctuary (Kandhulimas) | Whole fish | Delivery pain, abdominal pain | Fish is roasted and cooked with mustard oil and consumed. | 2 |
| *Trichogaster fasciata* | Bodo tribe of Kokrajhar (Bengshi) | Flesh, head, Meat | Cold, fever, jaundice, general weakness | Cooked and consumed. | 3 |
| *Trichogaster lalius* | Bodo tribe of Kokrajhar (Bengshi) | Whole fish | Typhoid, general illness | Dried fish is cooked with vegetables and herbs and consumed. | 3 |
| *Badis badis* | Bodo tribe of Kokrajhar (Dusumwi) | Flesh, head | Postpartum respiratory issue (Puwati) | Cooked with medicinal plants (Mani muni, Sibru, Jwglaori and Nwrsing) and consumed. | 3 |
| *Xenentodon cancila* | Adjoining area of Pobitora Wildlife Sanctuary (Kokilamas) | Whole fish | Joint pain, swelling | Cooked and consumed. Spine and bones used to prick out clotted blood. | 2 |
| | Bodo tribe of Kokrajhar (Kangkila) | Head, snout, whole fish | Tool to remove hematoma, headache | Dried fish is boiled and consumed. | 3 |
| *Botia dario* | Bodo tribe of Kokrajhar (Balabatia) | Flesh, head | Cold, fever, anemia | Cooked and consumed. | 3 |
| *Chaca chaca* | Adjoining area of Gibbon wildlife Sanctuary (Kurkurimas) | Meat | Asthma | Dried fish ground and prescribed to drink with water. | 1 |
| | Adjoining Area of Pobitora Wildlife Sanctuary | Whole fish | Polio | Dried fish cooked with vegetables and spices and prescribed to consume. | 2 |
| *Lepidocephalichthys guntea* | Bodo tribe of Kokrajhar (Balabatia) | Whole fish | Mouth and tongue ulcer | Steam cooked by wrapping in a plant leaf, made into fine paste, and applied. | 3 |
| *Heteropneustes fossilis* | Adjoining area of Gibbon Wildlife Sanctuary (Singhimas) | Whole body | Pain, wound healing | Cooked with black pepper and consumed. | 1 |
| | Karbi tribe of Karbi Anglong District (Singki) | Brain, whole fish | Analgesic, anemia | Raw brain consumed when stung by fish itself. Boiled fish is prepared as tonic for the treatment of anemia. | 4, 9 |
| | Dimasa tribe of Karbi Anglong District (Nagen) | Whole fish | Postpartum weakness | Boiled fish is consumed to regain strength. | 4 |
| | Bodo tribe of Kokrajhar (Singi) | Meat | Anemia, immunity booster, digestion, general weakness | Consumption of boiled fish meat is prescribed. | 3 |
| | Tea Tribe | Whole fish | Wound healing | Fish cooked with black peppers and consumed. | 9 |

**TABLE 1** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Nandus nandus* | Bodo tribe of Kokrajhar (Tota) | Flesh, head | Mild cold, Fever, Anti-Microbial properties, Improve eyesight, General weakness | Cooked and consumed. | 3 |
| *Wallago attu* | Karbi tribe of Kokrajhar (Seketa) | Head | Liver tonic | Boiled fish head is consumed regularly. | 4 |
| | Mising Tribe of Dhemaji | Air bladder | Asthma | Used in diet for relief of asthma. | 5 |
| | Bodo tribe of Kokrajhar (Barli) | Skin muscle, air bladder, whole fish | Cure skin dryness, removes scar on skin, good nutrition | Cooked and consumed. | 3 |
| *Leiodon cutcutia* | Bodo tribe of Kokrajhar (Natepa) | Whole body | Skin wound, gastric, stomach issue, nocturnal enuresis | Dried fish is ground and applied as paste to treat wounds. Roasted fish are ground, mixed with water and consumed to cure gastric, stomach issues and nocturnal enuresis in children. | 3 |

Source: 1, Borah and Prasad (2017); 2, Borah and Prasad (2016); 3, Basumatary *et al.* (2023); 4, Teronpi *et al.* (2012); 5, Paul (2018); 6, Gogoi and Bora (2020); 7, Duarah and Das (2019); 8, Verma *et al.* (2014); 9, Nasreen and Borah (2023).

**TABLE 2** Ethnomedicinal use of fish species in Arunachal Pradesh, India.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Labeo rohita* | Nyishi tribe (Ngui) | Stomach, gut | Stomach ache, digestive problems | Intestines and stomach are smoked in fire, mixed with salt and taken with rice 2–3 times a day. | 1 |
| *Labeo* sp. | Tangsa tribe (Nyahnyal) | Whole body | Energy booster, source of vitamins | Raw fish is ground after scaling and gutting, mixed with local spices and edible leaves (*Bischofia javanica*), liquid sieved and drunk. | 2 |
| *Puntius* sp. | Adi tribe (Puthi mach) | Whole body | Diabetes | Cooked and consumed. | 3 |
| *Semiplotus* sp. | Nyishi tribe | Whole body, stomach, gut | Stomach ache, digestive problems, small pox | Cooked and consumed. | 1 |
| *Mystus cavasius* | Adi tribe (Tengna) | Whole body | General weakness | Prescribed for energy improvement. | 3 |
| *Sperata seenghala* | Adi tribe (Ari machh) | Whole body | Postpartum diet | Cooked and consumed. | 3 |
| *Channa punctata* | Adi tribe (Goroi) | Whole body | Postpartum diet, malaria | Cooked and consumed. | 3 |
| *Mastacembelus armatus* | Tangsa tribe (Ngahchim) | Whole body, gall bladder, mucus, blood | Body pain, malaria, BP, pregnancy (delivery) complication, energy booster, body burns | Chopped into fine pieces and applied as ointment for body pain. Cooked and consumed for curing malaria, BP, delivery complications, energy booster. Mucus is swallowed for body burns. | 2 |
| | Wancho tribe (Ngahpuh) | Whole body | Cut, burn, boil, wound | Saliva of a person after consuming the whole body is considered medicinal. | 2, 4 |

**TABLE 2** Continued.

| Fish | Ethnic tribe (vernacular name) | Parts used | Diseases / ailments | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Monopterus cuchia* | Tangsa tribe (Powshai) | Raw blood, Whole body | Blood purification, energy booster | Raw blood is consumed for blood purification. Fish is cooked and consumed as a supplement for energy. | 2 |
| *Anabas testudineus* | Adi tribe (Kaoui) | Whole body | Malaria, general weakness | Cooked and consumed. | 3 |
| *Anguilla* sp. | Nyishi and Galo Tribe | Body mucus | Burns | Mucus is applied on burn areas. | 1 |
| *Clarias batrachus* | Adi Tribe (Magur)<br>Tangsa tribe (Ngahpak) | Whole fish<br>Whole body | General weakness<br>Energy booster | Cooked and consumed.<br>Soup is prepared and consumed. | 3<br>2 |
| *Amblyceps* sp. | Galo tribe (Ngui) | Body mucus | Burns | Applied on burn areas. | 1 |
| *Chaca chaca* | Nyishi, Apatani, Monpa | Whole body | Pox, burn wound, skin disease | Dried fish grinded and applied to wound | 5 |
| *Heteropneustes fossilis* | Adi tribe (Singhi) | Whole body | General weakness | Cooked and consumed. | 3 |
| *Psilorhynchus ballitora* | Nyishi (Ngoka ngui) and Galo (Nyoka pagra) tribe | Whole body | Diarrhoea | Smoked, dried fish is consumed. | 1 |
| *Bagarius bagarius* | Galo tribe (Nguri) | Fins, Bones | Body burns, stomach ache | Smoked dried bones/fins are burnt to ash and applied on burnt portion twice a day. A pinch of ash is drunk along with water. | 1 |

Source: 1, Chakravorty *et al.* (2011); , Jugli *et al.* (2020); 3, Chinlampianga *et al.* (2013); 4, Sharma *et al.* (2021); 5, Solanki and Chutia (2009).

**TABLE 3** Ethnomedicinal use of fish species in Manipur, India.

| Fish | Veracular name | Parts used | Medicinal use | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Labeo pungasia* | Ngatin | Flesh | Postpartum weakness | Cooked or boiled fish is consumed regularly. | 1, 2 |
| *Pethia manipurensis* | Ngakhameingangbi | Whole fish | General weakness | Fish is cooked or boiled and consumed to regain health. | 1 |
| *Pethia ticto* | Ngakha | Whole fish | Blood purification, common cold | Fermented cooked with bamboo shoot is consumed for blood purification. Fermented, cooked with chilli is consumed to cure common cold. | 1 |
| *Puntius sophore* | Phabounga | Whole fish | Common cold | Sun-dried fish used in preparation of fermented product called Ngari. Ngari is cooked and consumed. | 1, 2 |
| *Mystus ngashep* | Nga-shep | Whole fish | Small pox | Cooked and consumed. | 1 |
| *Channa punctata* | Ngamubogla | Whole fish, bile | Diarrhoea, malaria | Cooked fish is consumed to cure diarrhoea. For malaria, bile is taken thrice a day till recovery. | 1 |
| *Monopterus albus* | Ngaprum | Whole fish, blood | General weakness, asthma, anemia | Raw meat and blood is consumed till recovery. | 1; 2 |
| *Anguilla bengalensis* | Ngaril laina | Flesh, fat | Rheumatoid arthritis | Flesh is cooked and consumed. Fat is applied and massaged. | 1, 2 |
| *Claria batrachus* | Ngakra | Whole fish | Small pox, postpartum diet | Cooked and consumed to treat small pox and to regain health after delivery | 2 |
| *Clarias magur* | Ngakra | Whole fish | Small pox, nutrition for children, postpartum diet | Cooked and consumed. | 1 |

**TABLE 3** Continued.

| Fish | Veracular name | Parts used | Medicinal use | Mode of prescription | Source |
|---|---|---|---|---|---|
| *Heteropneustes fossilis* | Ngachik | Brain | Analgesic | Raw brain is consumed. | 1, 2 |
| *Wallago attu* | Shareng | Whole fish, head | General weakness, Liver tonic | Boiled fish is consumed. | 1, 2 |
| *Sperata seenghala* | Bishnupur District (Ngachou) | Liver, eye, bile | Night blindness, fever | Boiled liver and decoction of eyeball used as remedy for night blindness. Crushed bile taken along with water for chronic fever. | 2 |
| *Opsarius bendilisis* | Ngawa | Whole body | Constipation, deworming | Cooked with pieces of *Pinus insularis* and *Murdania nudiflora* and water without oil. | 2 |
| *Catla catla* | Bao | Operculum | Ripening of boils | Crushed operculum is made into a paste and applied to the affected area. | 2 |
| *Channa orientalis* | Meitei ngamu | Whole body | Stone case; opening of swelling / boil inside the body | Cooked with *Cissus adnata* as curry once a week for one month | 2 |
| *Channa striata* | Ngamu porous | Whole body | Vitamins and general body tonic | Boiled with *Clarias batrachus* as soup. | 2 |
| *Colisa sota* | Tombema, Phetin | Whole body | Postpartum diet | Sundried fish is crushed with *Alocassia indica* and made into a fermented paste. | 2 |
| *Eosomus danricus* | Phabou nga | Whole body | Lactation | Smoked fish cooked with *Allium sativum*, *Allium cepa* as curry; orally taken twice daily in the morning and evening for two days. | 2 |
| *Eutropiichthys vacha* | Ngahei | Flesh | To improve brain and Tuberculosis | Used as curry two times in a week for one month | 2 |
| *Hilsa ilisha* | Illisha | Oil | Arthritis, cracked heels. Night blindness and scurvy | Used as ointment for hands, heels and legs. | 2 |
| *Labeo rohita* | Rou | Eye, oil | Night blindness | The boiled decoction of eye and fish oil is given to the patient two/three times in a week. | 2 |
| *Mastacembelus armatus* | Ngaril | Flesh, liver, bile | Kwashiorkor, Night blindness, Chronic fever | Liver is boiled and the bile is crushed with water. Soup is taken for two times a day for one week. | 2 |
| *Mystus bleekeri* | Ngashep | Whole body | Dysentery | Boiled with *Portulaca oleracea*, curry taken two times daily for three days. | 2 |
| *Osteobrama belangeri* | Pengba | Oil | Aphrodisiac and loosening of vaginal muscles. | Oil is extracted from pectoral muscle and mixed with root juice of *Musa paradisiaca*; taken as tonic once daily for a month. | 2 |
| *Osteobrama cotio* | Ngaseksa | Whole body | Treatment of Ringworm | Sundried whole body crushed into a powder and used as dried powder. | 2 |

Source: 1, Devi *et al.* (2015); 2, Chanu *et al.* (2016).

**TABLE 4** Ethnomedicinal use of fish species in Nagaland, Tripura, Meghalaya and Mizoram of India.

| State | Fish | Tribe (vernacular name) | Parts used | Medicinal use | Mode of prescription | Source |
|---|---|---|---|---|---|---|
| **Nagaland** | *Barbus* sp. | Chakhesang tribe | Mucus | Chicken pox | Applied topically. | 1 |
| | *Amphipnous cuchia* | Ao tribe (Ngalang) | Blood | Asthma, general weakness | Fresh blood is drunk. | 2 |
| | *Monopterus albus* | Naga tribe | Blood | Anemia, asthma, general weakness | Fresh blood is drunk. | 3 |
| | *Monopterus cuchia* | Naga tribe | Blood | Anemia, asthma, general weakness | Fresh blood is drunk. | 3 |

**TABLE 4** Continued.

| State | Fish | Tribe (vernacular name) | Parts used | Medicinal use | Mode of prescription | Source |
|---|---|---|---|---|---|---|
| **Tripura** | *Channa punctata* | Khowai District (Lati) | Head | Reproductive health | Soup is prepared and consumed. | 4 |
| | *Monopterus cuchia* | Khowai District (Kaicha) | Blood | Hair loss | Fresh blood is massaged onto affected areas. | 4 |
| **Meghalaya** | *Channa Striata* | Khasi tribe (Dohthli) | Life fish | White blemishes on tongue, lips in newborns | Live fish kept near baby's mouth to rub lips | 5 |
| | *Amphipnous cuchia* | Garo Tribe of Garhbhanga Reserve Forest | Blood | General weakness, asthma, anemia | Fresh blood is drunk. | 6 |
| **Mizoram** | *Cyprinus carpio* | Mizoram (Sangha) | Bile, fats | Fever, headache | Bile is swallowed, fats is consumed. | 7 |
| | *Bagarius bagarius* | Mizoram (Thaichawni-nu) | Fatty-oil | Gout, rheumatism and joints | Equal part of fatty oil with *Rhyticeros undulates, Hylobates hoolock* and *Panthera tigris* are mixed and massaged to the body. | 7 |

Source: 1, Das *et al.* (2017); 2, Kakati *et al.* (2006); 3, Jamir and Lal (2005); 4, Das (2015); 5, Mihsill and Keshan (2017); 6, Hazarika (2021); 7, Chinlampianga *et al.* (2013).

## 4 | DISCUSSION

Northeast India, a region rich in cultural and biological diversity, stands as a remarkable example of the intersection of traditional knowledge and natural resource utilization. Indigenous communities in this region have developed intricate and sustainable systems of ethnomedicine, with a significant focus on ichthyofauna as therapeutic agents. These practices highlight the profound relationship between the local communities and their environment, especially in the use of fish-based remedies for managing various health conditions. The role of fish in these traditional healing practices transcends physical health, linking cultural and spiritual beliefs with medicinal uses, thereby offering a holistic approach to well-being (Prakash and Prakash 2021).

### 4.1 The role of fish in traditional medicine

The role of fish in traditional medicine across Northeast India is multifaceted, with fish-based remedies being used to treat a wide array of ailments, from common colds and gastrointestinal issues to more complex conditions like asthma and tuberculosis. Fish species such as *C. punctata* and *M. cuchia* are commonly used for their health benefits, particularly for conditions like respiratory ailments, anaemia, general weakness, and digestive disorders. These species are frequently consumed either in their entirety or in specific parts, such as their flesh, blood, skin, or mucus, each believed to offer unique therapeutic properties (Das *et al*. 2017).

**TABLE 5** Family and IUCN (2025) status of the fish species used for ethnomedicine in Northeast India.

| Family | Scientific name | IUCN status |
|---|---|---|
| Ambassidae | *Chanda nama* | LC |
| | *Parambassis lala* | NT |
| | *Parambassis ranga* | LC |
| Amblycipitidae | *Amblyceps* sp. | LC |
| Anabantidae | *Anabas testudineus* | LC |
| Anguillidae | *Anguilla bengalensis* | NT |
| | *Anguilla* sp. | - |
| Badidae | *Badis badis* | LC |
| Bagridae | *Mystus bleekeri* | LC |
| | *Mystus carcio* | LC |
| | *Mystus cavasius* | LC |
| | *Mystus ngasep* | NE |
| | *Sperata seenghala* | LC |
| | *Mystus* sp. | - |
| | *Mystus tengara* | LC |
| Belonidae | *Xenentodon cancila* | LC |
| Belontidae | *Trichogaster labiosa* | LC |
| Botiidae | *Botia dario* | LC |
| Chacidae | *Chaca chaca* | LC |
| Channidae | *Channa gachua* | LC |
| | *Channa marulius* | LC |
| | *Channa orientalis* | VU |
| | *Channa punctata* | LC |
| | *Channa stewartii* | LC |
| | *Channa striata* | LC |

**TABLE 5** Continued.

| Family | Scientific name | IUCN status |
|---|---|---|
| Clariidae | *Clarias batrachus* | LC |
| | *Clarias magur* | EN |
| Cobitidae | *Lepidocephalichthys gutea* | LC |
| Cyprinidae | *Amblypharyngodon mola* | LC |
| | *Barbus* sp. | - |
| | *Cyprinus carpio* | VU |
| | *Danio aequipinnatus* | LC |
| | *Danio rerio* | LC |
| | *Labeo gonius* | LC |
| | *Labeo pangusia* | NT |
| | *Labeo rohita* | LC |
| | *Labeo* sp. | - |
| | *Pethia manipurensis* | EN |
| | *Pethia ticto* | LC |
| | *Puntius sarana* | LC |
| | *Puntius sophore* | LC |
| | *Puntius* sp. | - |
| | *Rasbora daniconius* | NE |
| | *Rasbora* sp. | - |
| | *Semiplotus* sp. | LC |
| | *Opsarius bendelisis* | LC |
| | *Catla catla* | LC |
| | *Eosomus Danricus* | LC |
| | *Osteobrama belangeri* | NT |
| | *Osteobrama cotio* | LC |
| Dorosomatidae | *Tenualosa ilisha* | LC |
| Gobiidae | *Glossogobius giuris* | LC |
| | *Glossogodius* sp. | - |
| Heteropneustidae | *Heteropneustes fossilis* | LC |
| Mastacembelidae | *Macrognathus aral* | LC |
| | *Macrognathus pancalus* | LC |
| | *Mastacembelus armatus* | LC |
| Monopteridae | *Amphipnous cuchia* | LC |
| | *Monopterus albus* | LC |
| | *Monopterus cuchia* | NT |
| Nandidae | *Nandus nandus* | LC |
| Notopteridae | *Chitala chitala* | LC |
| | *Notopterus notopterus* | LC |
| Osphronemidae | *Trichogaster fasciata* | LC |
| | *Trichogaster lalius* | LC |
| Psilorhynchidae | *Psilorhynchus ballitora* | VU |
| Schilbeidae | *Eutropiichthys vacha* | LC |
| Siluridae | *Wallago attu* | VU |
| Sisoridae | *Bagarius bagarius* | VU |
| Tetraodontidae | *Leiodon cutcutia* | NE |

LC, Least Concern; NT, Near Threatened; NE, Not Evaluated; VU, Vulnerable; EN, Endangered.

Research on the medicinal value of fish highlights the presence of bioactive compounds in these species that contribute to their efficacy. For instance, omega-3 fatty acids found in fish oils are widely recognized for their anti-inflammatory and cardioprotective effects (Ashraf *et al*. 2020). Similarly, collagen found in fish skin and bones has proven benefits in skin health and wound healing, which is particularly relevant to the region's use of fish skin in treating skin conditions such as chickenpox and wounds (Simopoulos 2002; Furtado *et al*. 2022). The consumption of fish also offers a rich source of protein, essential fatty acids, vitamins, and minerals, which play an important role in overall health, boosting immunity, and supporting tissue regeneration (Awuchi *et al*. 2022).

### 4.2 Fish-based remedies across different states of Northeast India

Fish-based remedies are an integral part of traditional healthcare across Northeast India, with each state having unique practices that highlight the region's deep connection to ichthyofauna. In Nagaland, tribes like the Naga and Chakhesang use fish species such as *M. cuchia* and *A. cuchia* to treat asthma, anaemia, and general weakness by consuming their blood or mucus (Jamir and Lal 2005; Kakati *et al*. 2006). In Tripura, particularly in the Khowai district, *C. punctata* is used to treat sexual dysfunction, and *M. cuchia* is applied to treat hair loss through the massaging of fresh fish blood (Das 2015). Meghalaya's Khasi and Garo tribes also utilize fish in unique ways, with the Khasi using *C. striata* to treat white blemishes on newborns' tongues and lips, while the Garo use *A. cuchia* blood to combat general weakness (Mihsill & Keshan 2017; Hazarika 2021). Mizoram relies on *Cyprinus carpio* and *Bagarius bagarius* for fever, headaches, and joint pain relief, with the latter used in combination with other natural substances (Chinlampianga *et al*. 2013). In Assam, communities such as the Bodo and Mising rely on fish like *C. striata* for postnatal recovery and *W. attu* for bone healing and joint pain (Paul 2018; Basumatary *et al*. 2023). Arunachal Pradesh's indigenous tribes, like the Adi and Nyishi, use *Clarias batrachus* and *Chaca chaca* for fatigue and malnutrition, with fermented fish paste used for gastrointestinal health by the Apatani tribe (Solanki and Chutia 2009; Chinlampianga *et al*. 2013). In Manipur, the Meitei and tribal communities use species such as *Esomus danricus* and *Puntius sophore* for improving digestion and treating fever, while *M. albus* is consumed for respiratory illnesses (Chanu *et al*. 2016). Fish like Rohu (*Labeo rohita*) and Catfish (*Clarias batrachus*) are commonly consumed in cooked or dried forms to alleviate health issues. These practices are deeply rooted in the local culture and offer a valuable source of traditional healthcare (Dhakal *et al*. 2020).

The distribution of fish species used in ethnomedicine across the northeast India was documented, with Cyprinidae being the most common family, particularly in Assam, followed by Bagridae. Similar trends are found in Arunachal Pradesh and Manipur, while other states also feature Cyprinidae and Channidae. Table 5 complements

this by presenting the IUCN status of these species, showing that while many are classified as Least Concern (LC), some, like *Bagarius bagarius* and *Psilorhynchus ballitora*, are Vulnerable (VU), underscoring the need for conservation. These examples reflect the deep cultural connection to fish across the ethnic communities in Northeast India, where fish are considered both a source of nourishment and integral to health and spiritual practices. The diverse fish-based remedies highlight the significance of local ecological knowledge and the intimate relationship indigenous populations maintain with their natural resources.

**4.3 The bioactive compounds in fish and their medicinal potential**

The therapeutic potential of fish species used in traditional medicine is attributed to several bioactive compounds present in these species. Omega-3 fatty acids, found abundantly in fish oils, have demonstrated benefits in reducing inflammation and enhancing heart health (Simopoulos 2002). Furthermore, collagen from fish skin is a key component in wound healing, offering antimicrobial and anti-inflammatory properties (Furtado *et al*. 2022). The consumption of fish also provides essential nutrients like vitamins A and D, as well as minerals like iodine and selenium, all of which contribute to general health and well-being (Awuchi *et al*. 2022).

In addition to the nutrients, certain fish species are believed to possess medicinal compounds that enhance blood circulation, improve digestion, and boost the immune system. For example, *M. cuchia* and *C. punctata* are consumed not only for their nutritional benefits but also for their therapeutic effects, including their ability to treat respiratory conditions, improve blood health, and alleviate gastrointestinal problems (Hussain and Tynsong 2021).

These bioactive compounds make fish-based remedies in Northeast India not only effective traditional treatments but also potentially valuable for further pharmacological research. By exploring the active compounds in these species, there may be opportunities to integrate traditional knowledge with modern medicine, contributing to the development of new therapeutic agents.

**4.4 Conservation of medicinal fish species**

One of the major challenges facing the continued use of fish in traditional medicine is the sustainability of these fish species. Overfishing, habitat degradation, and climate change have contributed to the decline of many fish species that are crucial for medicinal purposes, such as *Channa orientalis* and *M. cuchia* (IUCN 2025). The depletion of these species not only threatens biodiversity but also jeopardizes the cultural heritage of indigenous communities who rely on them for their health practices.

In response, some communities have adopted traditional conservation practices, such as seasonal fishing bans and the establishment of protected areas, to help ensure the sustainability of medicinal fish species. Additionally, aquaculture is being explored as a potential solution to supplement wild fish stocks, allowing communities to maintain their traditional practices while reducing pressure on wild populations (Kechu and Pankaj 2023).

Conservation strategies need to be integrated with community-led efforts, ensuring that indigenous knowledge is not only preserved but also respected in modern conservation policies. Efforts to create fish sanctuaries and regulate the harvesting of medicinal species can help balance the need for sustainable resource management with the preservation of cultural traditions (Sharma *et al*. 2021).

Fish-based remedies remain an integral part of the traditional healing systems of Northeast India, showcasing the deep knowledge indigenous communities have developed about their natural environment. The use of ichthyofauna for treating a range of ailments, from respiratory conditions to gastrointestinal issues, reflects both the medicinal value of fish species and their cultural significance. As research into the bioactive compounds in these fish species continues to expand, there is growing potential for integrating these traditional remedies into modern healthcare systems.

However, the sustainability of medicinal fish species is threatened by various environmental challenges, and there is an urgent need for conservation efforts. By combining indigenous conservation strategies with modern scientific research, it is possible to ensure the continued availability of these valuable fish species. Furthermore, interdisciplinary research focusing on the pharmacological potential of these species could pave the way for the development of new medicines, benefiting both local communities and global healthcare systems.

This study serves as a reminder of the importance of preserving indigenous knowledge systems and integrating them into contemporary healthcare practices. The intersection of biodiversity conservation, cultural heritage, and modern medicine offers a unique opportunity to address healthcare challenges while respecting the wisdom of indigenous communities.

**5 | CONCLUSIONS**

This study explores the ethnomedicinal practices and therapeutic uses of fish species in Northeast India, highlighting the strong connection between indigenous communities and their aquatic ecosystems. It reveals how species like *C. punctata*, *M. cuchia*, and *L. pangusia* are used to treat various ailments, reflecting deep traditional knowledge. The cultural and spiritual significance of these practices emphasizes a holistic approach to health, where physical, emotional, and spiritual well-being are interconnected.

However, the sustainability of these practices is threatened by environmental challenges like habitat destruction, overfishing, and climate change, which endanger vital fish species. To address these issues, a collaborative approach involving indigenous communities, conservationists, and policymakers is essential. Efforts should include sustainable fishing practices, fish sanctuaries, and habitat restoration.

The study also suggests the potential integration of traditional fish-based remedies into modern healthcare systems, particularly for conditions such as respiratory and gastrointestinal issues. Scientific validation of these remedies could lead to novel, affordable treatments. The study concludes by emphasizing the importance of combining biodiversity conservation with the preservation of indigenous knowledge, encouraging further research into medicinal fish species and sustainable practices.

**CONFLICT OF INTEREST**

The author declares no conflict of interest.

**AUTHORS' CONTRIBUTION**

Veselu Khesoh conceptualized, gathered ethnomedicinal data, and performed the primary data analysis. She also drafted and wrote the manuscript. Mayur Mausoom Phukan contributed to the methodological design and provided critical revisions related to ecological and conservation aspects. Pranay Punj Pankaj supervised the overall research process, guided the ethnopharmacological and zoological interpretations, and critically reviewed the manuscript. He also handled all correspondence as the corresponding author and ensured the scholarly rigor and coherence of the final version.

**DATA AVAILABILITY STATEMENT**

The data supporting the findings of this study are available within the article [and/or] its supplementary materials.

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