Ethnomedical use of fishes by tribal communities in India: A review

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Abstract

Study on fish based Zootherapy could be a viable option for discovery of new compounds with therapeutic potentials. In India from primitive time animals are used as medicine to cure different diseases by tribal communities. However, the present generation attitude toward traditional medicine as being unscientific and acculturation are the main causes of decline of such practices in tribal societies. The present review article describes the traditional knowledge of the ichthyotherapy, the use of fishes as medicine to cure human different diseases by tribal communities of India. Respondent listed about 45 fresh water fish species, which are used in primary health care needs of human being. Head, eyes, blood, gall bladder, bile, flesh, fins, bones, mucous, air bladder, otolith etc. are most commonly used parts to treat diseases such as asthma, cough and cold, chicken pox, small pox, kala-azar, diarrhea, malaria, anemia, general weakness, Premenstrual pain, abdominal pain, headache, fever, arthritic etc. The findings are more important for remedial measure and documentation although these have to be tested scientifically and clinically. It is essential to study in detail the use of these fish parts which may in future help medical science and also call for conservation of these fishes. Study on ichthyotherapy could be a viable option for discovery of new compounds with therapeutic potentials. The present ichthyotherapy work has been studied from different published research paper of various authors on ethnozoology/zootherapeutic studies in India from 1987 to 2020 and it gave us an idea that many types of diseases are cured by fishes and their body parts.

Keywords: Ichthyotherapy, ethnomedicine, cure, disease, tribal community

Introduction

Animals occupy an important position in culture and religion of traditional societies all over the world. Animals, whether domestic or wild, have always been providing a number of goods and services to human beings. The ethnic people maintained a healthy natural environment by making prudent use of the biological resources. The wildlife provides protein and other necessary food materials to the rural tribal communities of developing countries including India. Besides this, animals and animal derived products have always been source of traditional or folk medicine which still prevalent among the tribal communities in India as means of primary health care. Poverty and limited access to modern medicine are the main factors for their dependence on traditional medicine, particularly in rural areas.

World Health Organization (WHO) defines traditional medicine as “the sum total of knowledge, skill and practices based on theories, beliefs and experiences indigenous to different cultures that are used to maintain health as well as to prevent, diagnose, improve or treat physical and mental illnesses.”

Traditional medicine is not only a source of healing, but the practice is also an important part of their religion and culture. So, far as modern medicine is concerned, it is reported that more than half of the world’s modern drugs are of biological sources and out of 252 that has been selected by WHO as essential to human health, 8.7% comes from animal sources (Lohani, 2010) [23]. Although traditional medicine mainly relies on herbal treatment but animals (whole and their body parts) and their products are also used. It has been reported that more than half of the world’s modern drugs are of biological resources.

Due to the vast progress and researches in allopathic drugs there has been a great set-back for the traditional drugs all over the world and in India also. If one looks into the olden days, one can find the frequent use of such traditional drugs by our ancestors to cure the various human ailments. World Health Organization has reported that about 80 percent of the world’s populations rely primarily in folk medicine derived from plant and animal origin for immediate cure against illness (Soni et al., 2020) [34].
The traditional medicinal knowledge of the indigenous people across the globe has played an important role in identifying living organisms which are used in treating livestock and human health problems, and loss the knowledge may exert a significance adverse impact on the development of modern medicine (Yirga et al., 2011) [37]. Hence, it is important to document, as much as possible, the traditional knowledge of various tribal communities which are on the verge of losing their socio-economic and cultural characteristics (Alves and Rosa, 2007; Jamir and Lal, 2005; Chau et al., 2014) [1, 9, 16]. Research interest and activities in the area of ethnobiology and ethnomedicine have increased tremendously since last decade. By the end of the 20th century, the life of the traditional communities was disturbed and disrupted, causing imminent danger of extinction of their culture and ethnomedical practices which their forefathers had. In India the traditional knowledge system is fast eroding due to urbanization. So, there is an urgent need to inventories and systematic documentation of such precious ethnobiological knowledge among different ethnic communities before the traditional cultures are completely lost.

Ethnozoology focuses at direct relationship of animals to mankind. Ethnozoology is a branch of biology which deals the relationship with tribal people to animals and their interaction. Ethnozoology is divided into number of branches such as ethnoentomology (deals the therapeutic use of insect in human health care), ethnoichthyology (deals the therapeutic use of fishes in human health care), ethnoherpetology (deals the therapeutic use of snakes in human health care) and ethnoornithology (deals the therapeutic use of birds in human health care). Zootherapy is an integral part of traditional health care practice among the ethnic communities in India but there is a dearth of reports in this regard. A large number of animals had been found providing a number of substances with medicinal properties which the people use to treat a wide range of ailments (Chau et al., 2014) [9]. In India there has been only few articles have been published with an ethnozoological approach, although some anthropological, folk and ethnomedical studies have focused on the connections between human society and animals (Joseph, 1982; Gupta, 1987; Puspangadhan, 1990; Sharma, 1990; Azmi, 1989 & 1991; Jamir and Lal, 2005; Azmi and Bharti, 2013; Chau et al., 2014; Borah and Prasad, 2017; Prakash, 2017; Chhetri et al., 2020; Prakash and Yadav, 2020; Prakash and Verma, 2021) [2, 3, 5, 8-10, 14-16, 18, 27-30].

Fishes have a long history of interaction with humans, thus “ethnoichthyology” is playing an important role in ethnozoological research (Begossi and Garavello, 1990) [7]. Besides being a source of food, fish is used for treatment of different ailments by various groups of tribal people around the world and in India also. There are large number of fish species used in traditional medicines, mainly in fishing communities to treat illnesses and health conditions in India (Azmi and Bharti, 2013; Teronpi et al., 2012; Gupta and Day, 2017; Prakash and Yadav, 2020) [3, 14, 34, 29], however, the documented report on the therapeutic use of fish in health care practices among the tribal population was very scanty and scattered.

India is gifted immense faunal and floral biodiversity, because of the extreme variation in geographical and climatic condition prevailing in the country (Bagde and Jain, 2013) [5]. The freshwater fish fauna of India is highly diverse in nature and constituting 1027 species (Gopi et al. 2017) [13]. In India, different tribal and ethnic communities are lived throughout the country. People of these communities great knowledge about ichthyofauna and their medicinal value, and they also provide considerable information about the use of freshwater fishes and their by-products as medicine. Most of the rural areas, tribal and ethnic people are totally dependent on local traditional medicinal system for their health care because they are living in remote areas where hospital and other modern medicinal facilities are not available, so they use their traditional knowledge for medicinal purpose and this knowledge is passed through oral communication from generation to generation (Jaroli et al., 2010) [7]. This review paper illustrates the therapeutic use of fish species by Indian ethnic societies. It provides an inventory of the species that have been used for medicinal purposes from ancient times to the present, and analyses the medical use of fishes in the 20th century. Thus, our main objective is to obtain an inventory of the fish species that have been used in India for therapeutic purposes from antiquity to the present. From this we determine which medicinal species have survived to recent times and what diseases or medical conditions they have been used for.

Ethnomedicinal use of some fishes by ethnic communities of India

Traditional medicine is an indispensable part of primary health-care among the tribal communities in India. Traditional health-care practices of these tribal communities are generally based on religious beliefs and therefore, are an important driver for continuation of their culture (Teronpi et al., 2012) [34]. Fishes are the cheapest way for cure of various health disorders. Approximately 45 fresh water fish species are reported to use in the treatment of about 45 disease conditions as traditional medicine by different tribal communities in various parts of India. The inventoried fresh water fish species belongs to 9 order: Clupiformes (2), Siluriformes (9), Ophiocephaliformes (5), Synbranchiformes (3), Perciformes (2), Anabantiformes (2), Clupeiformes (2), Anguilliformes (1) and Beloniformes (1). Traditional health care practices among the tribal population in India include oral therapy, contact therapy, by preparing solutions or powders. The order, scientific name, common name and conservation status of fishes used by ethnic communities in India for medicinal purpose along with method of application is given in the table.

| Scientific/Common name (Conservation status) | Parts used | Disease condition | Method of application/consumption | Reference No. |
|--------------------------------------------|------------|------------------|----------------------------------|---------------|
| *Notopterus notopterus* (Pallas)/Featherback (LC) | Whole body | Abdominal & Delivery Pain | Burned and Cooked with black Pepper | [14] |
| *Hilisa ilisha* (Hamilton)/herring (LC) | Body oil | Arthritis, Cracked heels, Nightblindness, Scurvy | Used as ointment for hands, heels and legs | [9] |

**Order: Clupiformes**

**Order: Cypriniformes**
| Species                          | Part Used | Symptoms                                                      | Treatment                                                                 | Reference |
|---------------------------------|-----------|---------------------------------------------------------------|---------------------------------------------------------------------------|-----------|
| *Labeo rohita* (Hamilton)/Rohu, carp (LC) | Whole body | Rheumatism, Galactoschesia, Whooping cough, Bronchitis, Loss of sexual vigour | Fish Curry                                                              | [14, 29, 31] |
|                                 | Fat       | Fat Facial Paralysis                                          | Warmed, massaged externally thrice daily, for three weeks.                | [29]      |
|                                 | Eye, Oil/Fat | Night blindness                                               | The boiled decoction of eye and fish oil is given 2/3 times in a week.   | [9]       |
|                                 | Liver     | Night blindness                                               | Boiled in water, soup drunk and remained cooked and eaten                | [9]       |
|                                 | Scales/ Teeth/ Bones | Weak-sight, Eye troubles                                    | Incinerated powdered mixed in honey and applied into the eyes at bed time.| [29]      |
|                                 | Stone     | Kidney stone                                                 | 2mg stone taken orally                                                   | [5]       |
|                                 | Gall Bladder/Bile | Gastric enteritis, Gastric ulcer, Intestinal cancer         | Grounded the gall bladder with water or 8-10 drops bile diluted in one glass of water and drunk in empty stomach | [17, 29] |
|                                 | Cervical vertebra | Urine blockage Problem                                       | A cervical vertebra is rubbed with water and this essence water is taken. | [25]      |
| *Labeo pangusia* (Hamilton)/Carp fish (LC) | Flesh | Food Poisoning Brain improvement                              | The cooked fish is given as antidote for food poisoning                  | [9]       |
|                                 | Bile      | Weakness after delivery                                       | Boiled fish is taken as tonic                                            | [17, 34] |
| *Labeo gonius* (Hamilton)/Carp fish (LC) | Flesh, Bone | Obesity; Allergy                                              | Bile is taken orally                                                     | [11, 26, 31] |
| *Catla catla* (Hamilton)/BCatla (LC) | Opercul-um | Ripening of boils                                             | Crushed operculum is made into paste and applied to affected area        | [9]       |
| *Barbus* sp. (Cuvier & Cloquet)/Ray fined fish (LC) | Slime/ Mucous | Chicken pox                                                   | Mucous applied on affected parts                                         | [11]      |
|                                 | Whole body | Eye problem                                                   | Cooked with black pepper                                                 | [12]      |
|                                 | Head      | Night blindness                                               | Cooked head consumed                                                      | [34]      |
| *Amblypamfrogyodon mola* (Hamilton)/Mola (LC) | Whole body | Premenstrual pain; Chicken & small pox, Pain, Asthma          | Boiled or Cooked the Fish with light spices and consumed                 | [11, 14, 8, 29] |
| *Semiplotus* sp. (Bleeker)/king fish (LC) | Stomach & Gut | Stomach ache & digestive problems                             | Cooked/ boiled with black pepper and salt                                | [11]      |
|                                 | Whole body | Small Pox                                                     |                                                                               |           |
| *Chela bacaila* (Hamilton)/Chilwa | Whole body | Weal-sight, Night blindness, Eye ailments                    | Boiled, squashed, macerated in water and taken; Deep fried in mustard oil, extracted the oil from the body and applied into eyes. | [29]      |
| *Cyprinus carpio* (Linnaeus) /Common carp (VU/TH) | Bile, Fat | Fever, Headache                                              | Bile are swallowed; Fat is taken/eaten                                    | [20]      |
| *Danio aequipinnatus* (McClelland)/Giunt danio (LC) | Whole body | Constant spitting                                             | Boiled fish is consumed                                                   | [34]      |
| *Tor puntitora* (Hamilton)/Mahaseer (EN) | Bile | Asthma                                                        | Fresh bile taken orally                                                   | [22]      |
| *Tor tor* (Hamilton)/Mahaseer (NT) | Bile | High fever                                                   | Fresh bile taken orally                                                   | [21]      |
| *Psilorhynchos pseudenechensis* (Menon & Dutta)/Nepalese Minnow (LC) | Whole body, Bile | High fever, problem in Urine discharge                        | Cooked and eaten orally, Bile is taken orally in case of high fever      | [21]      |
| *Psilorhynchos balitora* (Hamilton)/Balitora minnow (LC) | Whole body | Diarrhoea                                                     |                                                                               | [11]      |
| *Schizothorax plagiostomus* (Heckel)/Snow trout | Bile | Body ache, Headache                                           | Bile is taken orally                                                      |           |
| *Barilius bendelisis*            | Whole body | Constipation, deworming                                       | Cooked with pieces of *Pinus insularis & Murdania*                        | [9]       |

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| (Hamilton) (LC) | (Valenciennes) (NT) | Smooth breasted snake fish | Channa orientalis | The Pharma Innovation Journal | (Schneider)/Pardhin | (Bloch)/Mangur | Osteobrama belangeri | Channa stevvartii | Oil is extracted from pectoral muscles and mixed with | [9] |
|---|---|---|---|---|---|---|---|---|---|---|
| Osteobrama Cotio cotio | Whole body | Ringworm | Sundried whole body crushed into a powder and used as dried powder | [9] |
| Exosmos danricus (Hamilton)/Flying barb (LC) | Whole body | Lactation | Smoked fish cooked with Allium sativum and Allium cepa as curry and takes twice daily for two days | [9] |

**Order: Siluriformes**

| Heteropneutes fossils (Bloch)/Singhi (LC) | Whole body | Anemia, Weakness after delivery | Boiled Fish | Pain, Wound healing, Impotency | Cooked fish | Blood Purifier, Anemia | Cooked/Boiled with Phyllogacanthus thyridius | [8, 29] |
|---|---|---|---|---|---|---|---|---|---|
| Clarias batrachus (Linnaeus)/Mangur (LC) | Whole body | Small pox | Cooked fish | Weakness after delivery | Boiled fish is taken regularly to regain the strength | Body ache, Bronchitis Wound healing | Cooked with black pepper and take orally | [8, 29] |
| Mystus sp. (Bloch) /Tengara (LC) | Whole body | Small pox | Boiled with Portalaca oleracea, curry taken twice daily for three days | After delivery to new mother | Used as tonic | Dysentery | [9] |
| Aorichthys seenghala (Sykes) | Liver, Eye | Nightblindness | Boiled liver and eyeball | Numbness | Body ache | Fat & Oil | Head | [9] |
| Wallago attu (Schneider)/Pardhin (LC) | Liver, Eye | Nightblindness | Boiled liver and eyeball | Numbness | Body ache | Fat & Oil | Head | [9] |
| Chaca chaca (Hamilton)/Devil fish (LC) | Fat | Loss of erectile power | Warm fat massaged on the lumbo-sacral region at night | Burn, Wound, Foot cracks | Warmed and applied externally | [9] |
| Bagarius bagarius (Hamilton)/Ga getic goomch (NT) | Fins & Bones | Body Burn; Stomach Pain | - | Body Burn | [11] |
| Amblycops sp. (Blith) | Bones | Body Burn | - | [11] |
| Eutropicthys vacha (Hamilton) (EN) | Flesh | Tuberculosis, To improve Brain | Used as curry two times in a week for one month | [9] |

**Order: Ophiocephaliformes**

| Channa Punctatus (Bloch)/Snake headed fish (LC) | Eyes | Corn or Clavus | Eyes mixed with salt and applied to affected part to remove corn | [14, 34] |
|---|---|---|---|---|
| Head | Swelling of the testicles | Heads are tapped on the affected testicle to control swelling | [34] |
| Bile | Malaria | Bile is taken orally twice a day till recovery | [11] |
| Whole body | After delivery to new mother; Body Pain | Used as tonic | [34] |
| Channa striatus (Bloch) /Snake headed fish (LC) | Whole body | Diabetes, Pain, High BP | Boiled in water with salt and make a soup than drink | [29] |
| Channa orientalis (Bloch)/ Smooth breast snake fish (VU) | Whole body | Vitamins and general body tonic | Boiled with Clarias batrachus as soup | [9] |
| Channa stevartii (Playfair) /Snake headed fish (LC) | Whole body | Diabetes, Pain, High BP | Boiled in water and consumed | [8] |
| Channa gachua (Hamilton) /Snake headed fish (LC) | Whole body | Abdominal pain | Boiled fish | [11, 34] |

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| Biological resources | Medical usage |
|----------------------|---------------|
| **Gall bladder stone** | boiled and eaten | [12] |
| **Asthma, Tuberculosis** | Dried powder mixed with honey and consumed | [29] |
| **Flesh** | Diabetes General debility | Prepare soup with salt and light black pepper than taken orally. | [29] |
| **Mucous** | Menstrual irregularity | Dermal secretions are scrapped, dried and transformed into pills and taken orally | [29] |

**Order: Anabantiiformes**

| Fish | Whole body | Post delivery Period | | | | |
| Colisa sota (Hamilton) (LC) | Sundried fish is crushed with Alocassia indica and made into a fermented paste | [9] |
| Anabas testudineus (Bloch)/Climbing perch (LC) | Dymenorrhoea | Head boiled with spice | [14] |

**Order: Anguilliformes**

| Fish | Whole Body | Piles & Malaria | Cooked with Stelloria media and taken as soup | [9] |
| Anguilla bengalensis (Gray)/Fresh water Eel (NT) | Blood | Weakness | Blood of eel mixed with turmeric (hot dry) and taken orally | [11] |

**Order: Synbranchiformes**

| Fish | Meat | Prenomenstrual abdominal pain | Boiled fish | Raw fish is boiled and taken orally | [11, 14, 34] |
| Amphipnous cuchia (Hamilton)/Mud Eel (LC) or Monopterus cuchia (Cuchia Eel) | Blood | Asthma, Jaudice, Anemia, Kala-azar, Weakness, Diabetes | Raw Blood is Consumed | [11, 14, 24, 29, 34] |

**Order: Beloniformes**

| Fish | Whole body | Undernourished and anemic child and adult | The flesh is cooked in fresh milk and curry is taken once a week | [9] |
| Mastacembelus armatus (Lacepede)/Zig-Zag eel; Spiny eel (LC) | Flesh, Liver, Bile | Caruncle | Liver is boiled and bile is crushed with water. Soup is taken two times a day for one week | [9] |

**Order: Perciformes/Gobiiformes**

| Fish | Internal ear | Rickets in children and trouble in urinary passage. | Otoliths, hard calcium carbonate bodies present in internal ear are taken orally | [15] |
| Glossocephalus gur (Hamilton)/Tank goby (LC) | Flesh | Nocturnal enuresis (involuntary urination during sleep) | Cooked and eaten | [26] |
| Pseudocaena coitor (Hamilton) | | | | |

Pisces are one of the widely used animal groups by the ethnic communities of the India. Different ethnic groups are using 45 different species of fresh water fishes for medicinal purpose. The whole body and their body parts like head, eyes, blood, gall bladder, bile, flesh, fins, bones, mucous, air bladder, otolith etc. are most commonly used to cure diseases such as asthma, cough and cold, chicken pox, small pox, kala-azar, diarrhea, malaria, anemia, general weakness, Premenstrual pain, abdominal pain, headache, fever, arthritis etc. Mostly treated ailments are the asthma, anemia, joint pain, burn, anaemia, etc. Labeo sp., Puntius Sp., Channa sp., Anguilla sp., Heteropneustes fossilis, Clarias batrachus, Wallago attu, and Amphipnous cuchia are commonly used in treating number of human ailments. The population of these medicinal important fishes was drastically declined in their natural habitats due to indiscriminate and uncontrolled fishing and habitat destruction especially by using chemicals (Chanu et al., 2014) [9].

Conclusion

Traditional medicine is based on resource availability and therefore, study of such practices provides information about diversity and distribution of organisms in the past. Further, traditional knowledge of indigenous/tribal people can provide leads for sustainable use and management of natural biological resources. Today however, overexploitation of biological resources has pushed our natural resources toward the brink of collapse. Besides being a source of food, fish is
used in health-care practices among the tribal population of India. Poverty and limited access to modern medicine are the main factors for their dependence on traditional medicine, particularly in rural areas.

From this review, it can be concluded that people belonging to the different ethnic communities on India have a rich Ethnozoological knowledge and biological resources. Number of fishes had been found providing a number of substances with medicinal properties which the people use to treat a wide range of ailments. The present study indicated that fresh water fishes are still being used by different tribal communities of India, to treat various illnesses. The review throws light on the fact that fishes can be used in treating a number of human ailments. The empirical knowledge reported in this study will provide outstanding possibilities for the discovery of new sources of medicine for the drug industry. If fish can be used as a good source of simple forms of medicine traditionally used earlier, the common people may have an easy way to avoid the high cost of modern medical treatments, thereby improving their economic condition. Industrial pollution and destructive fishing practices by poisoning water bodies with synthetic chemicals pose serious threats to aquatic fauna especially freshwater fishes. Detailed investigations and proper traditional management strategy is urgently required to keep each species intact before the population of species dwindle (Chau et al., 2014) [9]. I hope that this review will be helpful in further research in the field of ethnozoology, zootherapy, ethnopharmacology and biodiversity conservation point of view.

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