International Journal of Zoology and Applied Biosciences **ISSN: 2455-9571**
Volume 4, Issue 6, pp: 245-257, 2019
https://doi.org/10.5281/zenodo.3580164
http://www.ijzab.com

Research Article

ETHNOZOOLOGICAL THERAPEUTIC PRACTICE OF TRIBALS OF MAYURBHANJ DISTRICT, ODISHA, INDIA

Suchismeeta Behera*[1] and Prafulla K. Mohanty[2]

[1]Postgraduate Department of Zoology, Utkal University, Vani Vihar, Bhubaneswar-751 004, Odisha, India

[2]Postgraduate Department of Zoology, Utkal University, Vani Vihar, Bhubaneswar-751 004, Odisha, India

Article History: Received 15th October 2019; Accepted 11th November 2019; Published 14th December 2019

ABSTRACT

Tribal population of Odisha and ethnozoological study have been undertaken to document the different ethnic communities of Mayurbhanj district of Odisha, India. The investigation is also an attempt to present a list of traditional medicaments from animal sources used for therapeutic purposes by different communities. A total 66 informants (male 48; female 18) were interacted and questioned with 58 number of similar type of query. Approximately 46, varieties of traditional medicaments from different animal sources have been identified which are traditionally being consumed for various diseases as per the opinion of 66 number of healers who have been practicing zootherapy. As per the data, it is found that 21 are mammals, i.e., 46.66% of the total numbers of animals are preferred to the treatment of asthma and respiratory diseases. Others are being used for the treatment of piles, production of semen, gastric disorder, fever, rheumatism, colic pain and some other related problems. Interestingly, in this region, maximum numbers of traditional healers have been prescribing cockroaches and red ants for various types of inflammation, skin diseases and to the patients having chronic illness as a common medicament. The scientific data are expected to be helpful for the ethnozoological researchers to investigate the potential bioactive compounds in the raw materials of animal origin thoroughly which are collected, preserved, and scientifically analyzed to establish the real myth behind the claim by the local healers.

Keywords: Ethnozoology, Zootherapy, Tradtional Medicine, Mayurbhanj.

INTRODUCTION

Human beings are close to nature and are dependent on its flora and fauna since time immemorial. Study of early human civilizations reveals that extreme proximity existed between human beings and nature. For a healthy human and natural environment, living beings rely upon the biodiversity and capacity of ecosystems to provide a multitude of bioresources (Alvard *et al*.,1997). Historical documents of ancient civilization reveal that a considerable number of drugs in modern medicine are figured in ancient manuscripts. All systems of traditional medicine have their roots in the medicine from ethnic claim and household remedies (Alves & Rosa, 2007). However, some of those earliest remedies were subjected to certain refinements, revisions and improvements through practices by trained medicine men. The people have been using various recipes traditionally from generation to generation and only some of them have been documented to strengthen the body resistance to disease (Alves & Albuquerque, 2012). The adaptation of various human groups to the rich biological resources has generated invaluable local knowledge systems that include extensive information on ethnozoological uses in general and medicinally useful species in particular (Alves, 2012; Rahman *et al.*, 2014).

To explore the new drugs, scientific communities depend vividly on biological source. From ancient India to the present era, all the systems of traditional medicine have their ancestry in folk medicine and household remedies (Alves *et al.*, 2013). Scientific research on the increased mortality rate suggests altering the treatment modalities on the earliest remedies through trained physicians. Accordingly, the changing scenario in the traditional ethnotherapeutic system emphasizes not to use raw crude drugs, but to use the active chemical moiety after its refinement, extraction, isolation and quantification aiming to incorporate it in suitable dosage form (Alves *et al*.,

*Corresponding Author: Ms. Suchismeeta Behera, Research Scholar, Postgraduate Department of Zoology, Utkal University, Vani vihar, Bhubaneswar -751 004, Odisha Email: suchismeeta.behera@gmail.com, Mobile: +91 9439494580

2010). Nowadays, there is an increasing desire to unravel the role of ethnozoological studies in trapping the centuries old traditional folk knowledge as well as in searching new resources of drugs etc. The adaptation of the various human groups to the rich biological resources has generated invaluable local knowledge systems that include extensive information on animal uses in general and medicinally useful species in particular (Adeola, 1992). Nevertheless, the use of animal species as remedies, and representing an important component of traditional medicine, has been less studied, than medicinal plants in the country.

The study of interaction, interrelationship and interdependence of humans on animals is termed as ethnozoology (Gr.*ethnos*- a nation; *zoion*- animal; *logos*-study or discourse). The ethonozoological practices focusing on treatment of ailments with remedies derived from animal or animal product is termed as zootherapy which has been widely practiced as well as accepted by many tribal inhabitants (Anadón *et al*., 2010). It serves as an inevitable part of their local culture as well as accepted by many tribal inhabitants as traditional medicine and also helps for evaluating animal-human relationship (Alves & Albuquerque, 2012).

In India, from the ancient era to the present era, Baidyas (ancient traditional physician like Charaka) have been practicing the traditional therapy. Therefore, some people are looking for traditional remedies for the treatment of ailments. But, in the changing scenario towards scientific modernization in India, this traditional knowledge is eroding very fast. Thus, documenting ethnozological traditional claim for inventory purpose has become inevitable. Therefore, ethnozoologists shoulder the responsibilities not only in inventorising the traditionally used biological resources, but also to conserve and revitalize the traditionally beliefs or claim, so that the age old cultures are not wiped out. The studies on the therapeutic uses of animals and their parts have been neglected, unexplored and studied when compared to plants. Thus, there is an urgent need to carry out such study in the field of ethnozoology and document it, so that it can be put to the welfare of human kind to ignite the young minds of budding researchers to identify, select, isolate and collect the important sources medicinally active chemical moiety from zoological source (Baker, 1941). Many ethnobiologist have collected zootherapeutic information from different ethnic groups or tribes in India. For example, it has been reported by several literatures that the traditional healers utilize the oil from the red velvet mite (*Trombidium grandissimum*) to cure multiple ailments such as paralysis which has also the ability to increase the sexual desire (Alves *et al*., 2009). Hence, documentation of all these data will certainly inspire the researchers to trace the vital chemical compound and gather scientific evidences in justifying the myth behind ethnic claim in ethnozoology and scientifically establishing its pharmacological activity (Prabhu *et al*., 2014).

The present study aims to enlist the zootherapeutic practices of tribal inhabitants of Mayubhanj district of Odisha, India. This investigation is also an attempt to present a list of animals used for various medicinal purposes by the various ethnic communities of the tribal dominated areas of Mayurbhanj district. The output of this study will not only be helpful in conservation of biodiversity in Odisha, but also give a clue to the scientific community to investigate the potential bioactive compounds in the raw materials of animal origin. Further, this particular scientific analysis will reveal to establish the myth behind traditional ethnic claim of local healers against varieties of ailments.

A major population of India constitutes tribes of different origin. The areas dominated by tribes are identified in Central India and regions of North East India. According to the data, tribal population of the country is 8.08% which includes 427 number of tribes (Naik & Doraiswamy, 1998). Literature study reveals that the tribal dominated communities in Odisha are of 95,90,756 numbers total population, i.e., male 47,27,732 numbers and female having 48,63,024 numbers (Sahoo, 2011). Being a tribal dominated state, it possesses the characteristic features of socio-cultural life and life style which are usually confined to their territory. Mayurbhanj district of Odisha is selected for the present study which aims to review the zootherapeutic practices of the various ethnic communities as this district has the highest concentration of Scheduled Tribe population in the state of Odisha (Sahoo, 2011) according to the report of statistical cell, Scheduled Castes and Scheduled Tribes Research and Training Institute, Bhubaneswar, Odisha 2015 (Anonymous, 2015).

MATERIALS AND METHODS

Study site

Mayurbhanj district is named after two rulers of medieval period namely Mayuras and Bhanjas who ruled at the same time over Bonai Mandal and Khijjinga Mandal, respectively. The exstate, named after the Mayuras and Bhanjas, merged with Odisha in January, 1949 and is known as Mayurbhanj district. The district is situated at the north east part of the state in the coordinates between 21^0-17^I N to 22^0-34^I N and 85^0-40^I E to 857^0-10^I E. The river basins of Budhabalanga and Kharkai make it rich in topographic variation (Sahoo, 2011). Simlipal Biosphere Reserve is present within the boundaries of this district. The district is divided into 26 blocks and lies adjacent to Balasore district in the east and Keonjhar district on the west. It shares its boundaries with Midinapore district of West Bengal and Singbhum district of Jharkhand on the north. As per population size, the district holds third position after Ganjam and Cuttack and first position in the highest number of tribal inhabitants among thirty districts of Odisha covering an area of 10,418 sq km according to the report of Statistical Cell, Scheduled Castes and Scheduled Tribes Research and Training Institute, Bhubaneswar, Odisha, 2015.

A field study was carried out from December, 2017 to February, 2018 in Jashipur, Thakurmunda and Similipal

Bioreserve area of Mayurbhanj district with the help of local leaders as mediator. Ethnozoological information about animals and their products used in zootherapy were gained through open group discussion, informal interviews and structured questionnaire. A total of 66 people, out of which 48 males and 18 females, were personally interviewed through structured questionnaire. Information regarding ethtnozoological claims and few samples possessing therapeutics activity were collected. The data included diseases, traditional methods of healing, use of animals and animal derived products for medication, local name of the animals, name of the diseases, mode of extraction of animal products, method of preparing medicines, dosage, duration of treatment, age of the patients etc.

Tribal Profile of Mayurbhanj District

According to the census 2011, the total ST Population of the state is 9591 (22.85% of total ST population) out of which 1480 is contributed by Mayurbhanj district alone which is 58.72% of its total Scheduled Tribe population of the State (Sahoo, 2011). 62 tribes are found in Odisha out of which 55 STs inhabit in Mayurbhanj. Santal is the dominating tribe of the district and other major tribes inhabiting in the district are Kolha, Bathudi, Bhumij, Munda, Gond, Saunti, Hill, Karia, Mahali while Mankirdia, Lodha, Kol, Kisan, Baiga and Holva are the minor tribes. There are 26 blocks in the district. The district constitutes 6 % of total state population, among which 56.6 % of total tribal people resides in the district (Sahoo, 2011).

Diseases and Ailments

All the tribes believe diseases as either natural or supernatural. Santal tribes believe that breach, taboo, sorcery, spirits, intrusion, evil eye, wrath of Gods and Goddesses, ghost intrusion, blood getting impure are the major causes of supernatural diseases.

Traditional Healers in Mayurbhanj District (Vaidyas)

The traditional healers referred to as 'Vaidya' in their local language, have been using zootherapy from time immemorial and are an integral part of their culture. The tribals have a strong belief that helath condition is related to their traditional parameters. The information regarding zootherapy being passes from generation to generation through narration and oral folk lore. There is no written documentation of these therapies, so far anywhere.

Gunia

Many tribes including the major tribe of the district, Santals have strong belief of supernatural powers are causes of health hazards. They believe in so called local gunia and their traditional method of supplying raw medicaments are obtained from ethnobiological sources of nature.

Climate of the area

Mayurbhanj experiences hot with dry climate in summer and dry with cold climate in winter. A semi-acrid climate prevails with maximum temperature ranging between 26^0 to 38^0C and a minimum temperature of 10^0-14^0C. A maximum 1200 mm rainfall has been recorded so far in the past couple of years. The land receives rainfall in the month of June to August through monsoon (Sahoo, 2011).

Relative frequency of citation (RFC)

Relative frequency of citation (RFC) index, fidelity level and relative importance were calculated by using the prescribed formulae (Vijayakumar *et al*., 2015).

A) Relative frequency of citation (RFC)

RFC index shows local importance of each species which is calculated as follows.

RFC =FC/N

FC= Informants mentioning about use of species, N=total informants.

RFC index 1 shows that there is usefulness of animal and when it is 0, it indicates no usefulness of animal.

B) Relative importance (RI)

The relative importance of animal species cited by the informants is calculated as per standard formula (Vijayakumar *et al.*, 2015).

RI= PP +AC

PP= Number of Pharmacological properties (reported specific ailments) attributed to a species divided by the maximum number of properties attributed to the most resourceful species (species with highest number of properties).

AC= Number of ailment categories treated by a given species divided by the maximum number of ailment categories treated by the most resourceful species.

Informants were selected on the basis of their experience and exposure to the traditional medicines.

RESULTS AND DISCUSSION

The total population of the district of Mayurbhanj, Odisha as per 2011 census is 25, 19,738 (Rural –23,26,842, Urban –1,92,896) out of which 12, 56,213 are Male (Rural - 11,57,576 & Urban-98,637) and 12, 63,525 are female (Rural -1169266 & Urban-94259) (Anonymous,2011). But the Scheduled Tribe Population of the district is 14,79,576 (Rural -1439002 & Urban-40574) out of which 730487 are Male (Rural-710396 & Urban -20091) and 749089 are Female (Rural-728606 & Urban -20483). Out of 26 Blocks, the tribal are mostly concentrated in Udala, Khunta,

Bijatala, Jamda, Baripada, Bangiriposi, Bisoi, Jashipur, Kuliana, Samakhunta, Kaptipada, Kusumi, Thakurmunda and Karanjia, where their population is more than 60% per cent of the total population of respective Blocks. he majority tribals of Mayurbhanj are the Santals, Kolha, Bathudi and Bhumija. The santals are the main inhabitant of Bijatolablock wherethey constitute about 77% of its total population.

Demographic information of the respondents was collected through face to face interaction. During the survey, it was found more number of males (72. 72%) are practicing more than that of females (27.27%). As the dominancy of male members is more than that of female in participation to answer several structured questionnaire, it is predicted that males are involved more in selection, collection, preservation and treatment of more number of medicaments from ethnozoological source. Similar trends were also reported in other studies also (Tables 1-8 and Figures 1-3).

Table 1. Tribes in Odisha at a glance with selected indicators.

Sl. No.	Indicators	Total	STs
1	Population (in millions)	41.97	9.59
2	Below poverty line (Rural Families)	44,73,658	13,99,245
3	Literacy rate (As per census 2011)	72.87	52.24
4	Enrolment (2013-14) (In thousands)/ School dropout rates in %	4,278 (thousand)/1.97%	1400(thousand)/2.71%
	I-V classes	1400 (thousand)/2.71%	507 (thousand)/3.63%
	VI-VII		
5	Health: Primary Health Centres (2012-13)	1805	471
	Including P.H.C (New) and CHC in number	6688	2096
	Health Sub- Centers (2012-13) in number		

(Source: Census of India, 2011. Provisional tribal population totals – Orissa.Government of India, Ministry of Home Affairs, Directorate of Census Operations, Orissa, Janpath, Unit-IX, Bhubaneswar-751 022).

Table 2. District-wise concentration of tribal population in Odisha 2011 Census.

Sl No.	District-wise concentration of Tribal Population in Odisha 2011 Census	Per cent (%)
1	Puri, Khordha, Bhadrak, Jajpur,Kendrapara, Jagatsinghpur, Cuttack, Ganjam	10
2	Bargarh, Boudh, Anugul, Dhenkanal, Balasore	10.0-20.0
3	Bolangir, Kalahandi	20.1-30.0
4	Nuapada, Samabalpur, Jharsuguda, Deogarh	30.1-40.0
5	Keonjhar	40.1-50.0
6	Malkanagiri, Koraput, Nawarangpur, Rayagada, Gajapati, Kandhamal, Mayurbhanj, Sundargarh	50.1 and Above

(Source: Census of India, 2011. Provisional tribal population totals – Orissa. Government of India, Ministry of Home Affairs, Directorate of Census Operations, Orissa, Janpath, Unit-IX, Bhubaneswar-751 022).

Table 3. Scheduled Tribes (ST) in Different block of Mayurbhanj district as per census, 2011.

Sl. No.	Name of the Block	ST Population (%)
1	Tiring	74.56
2	Bahalda	58.05
3	Jamada	73.36
4	Rairangpur	42.25
5	Bijotola	75.75
6	Kusumi	64.17
7	Bisoi	69.35
8	Jashipur	68.37
9	Raruan	53.63

10	Sukruli	62.97
11	Karanjia	60.12
12	Thakurmunda	74.92
13	Kaptipada	66.60
14	Udala	67.12
15	Gopabandhunagar	55.36
16	Khunta	79.02
17	Samakhunta	66.63
18	Bangiriposi	69.65
19	Sarasakana	57.86
20	Kuliana	66.28
21	Suliapada	40.51
22	Baripada	38.74
23	Badasahi	50.68
24	Betnoti	41.13
25	Rashagovindpur	54.61
26	Murada	44.03
	Mayurbhanj	55.58

(Source: Over all Scenario of the Scheduled Tribes in Odisha as per Census 2011 and Report Compiled by Statistical Cell, Scheduled Castes and Scheduled Tribes Research and Training Institute, Bhubaneswar, Odisha).

The age of the respondents varied from 36 to 78 years. The percentage of local medicinal practitioner with age lower than fifty was found to be very less with only 39.39% as compared to 60.61 % of the aged group of society above 50 years. The demographic table of the respondent shows that the age group of the society was more knowledgeable about traditional medicinal users than that of younger generation. Moreover, it is observed that aged people were experienced and the tribal patient community always prefers to the aged healer having ancestral healer background in the zootherpeutic practices which pass to them by their elders. Due to urbanization and massive awareness advertisement regarding so called untouchable diseases, the young educated tribal prefers to the application of allopathic therapy than that of traditional zootherapy.

Nonetheless, with globalization and easy access to conventional medicines, particularly the younger tribal generations are losing interest to learn the skill and acquire the traditional zootherapy (Chinlampianga *et al*., 2013). Therefore, this finding is the one of the ethnozoological studies in Odisha and perhaps the first of its kind in the district of Mayurbhanj to collect various relevant information regarding the traditional knowledge of zootherapy.

As far as our study area is concerned, a major portion of the male healers are involved in traditional zootherapy and impart their services. Though the majority of the practioner are from uneducated or poor education background, few young practioners are graduates also. Practioner having good educational background sometimes send patients to test some of the hematological and biochemical parameters and after treating, they also collect the reports as evidence to show it to other patients regarding the efficacy of their treatment using zootherapy. The traditional healers charge nominal consultation fees ranging between Rs10- Rs 60. Totally 46 number of animal species used in traditional medicine were cited by the informants. These are tabulated according to their zoological name, local name, parts used, disease, and mode of applications etc. Relative frequency of citation (RFC) index, fidelity level and relative importance were calculated by using the prescribed formulae. The categories with the largest numbers of medicinal species were also enlisted (Table 6).

Approximately 46 numbers of different species are reported in traditional medicine in different parts of Mayurbhanj district of Odisha. The mammals constitute the highest number of animals used for medicinal purposes. 21 mammals (46.66%), 5 invertebrates (11.11%), 5 insects (11.11 %), 4 pisces (8.88%), three reptiles (6.66%), three aves (6.66%), two amphibians (4.44%) and two arthropods (4.44%) have been reported for medicinal purposes (Table 7, Fig. 2). Approximately 47 medicinal uses of these animals are reported for different diseases in Mayurbhanj district. Many animals were used for the treatment of multiple ailments. Of these, the highest numbers of animal species (10, 21.27%) have been reported for the treatment of skin infection, different types of inflammation, asthma, bronchitis and respiratory disorders (Ediriweera and

Premaratna, 2012). The other reported diseases like gastric disturbances (09, 19.14%), anemia (02, 4.25%), epilepsy (02, 4.25%), gynecological problem (02, 4.25%) , pneumonia (01, 2.12%), blood borne diseases (02, 4.25%), paralysis (04, 8.51%), arthritis (02, 4.25%), antiseptic (07, 14.89%), treatment of impotency (2, 4.25%) and ear infection (1,2.12%) being treated traditionally with ethnozoological claims.

Table 4. Major tribal population concentration in 12 blocks.

Sl. No.	Name of the block	ST of total population of the district in percent
01	Tiring	74.56
02	Jamda	73.46
03	Bijatola	75.75
04	Bisoi	69.35
05	Jashipur	68.37
06	Thakurmunda	74.92
07	Kaptipada	66.60
08	Udala	67.12
09	Khunta	79.02
10	Samakhunta	66.73
11	Bangiriposi	69.65
12	Kuliana	66.28

Source: Census of India, 2011. Provisional tribal population totals – Orissa. Government of India, Ministry of Home Affairs, Directorate of Census Operations, Orissa, Janpath, Unit-IX, Bhubaneswar-751 022).

Table 5. Demographic profile of the informants included in the survey (N= 66).

Sl. No.	Demographic features	Number of people	Percentage (%)
	Age		
1	36-40	16	24.24
2	40-50	10	15.15
3	50-60	27	40.90
4	60-70	08	12.12
5	70-78	05	7.5
	Gender		
6	Male	48	72.72
7	Female	18	27.27
	Education		
8	Uneducated	16	24.24
9	Educated (High School and above can read, write an understand odia, hindi, english along with their local language)	40	60.60

Table 6. Animals used as medicinal purposes in different parts of Mayurbhanj, Odisha, India.

Sl No.	Zoological name	Local name	Parts used	Disease	Mode of applications	(RFC)	(RI)
01	*Amphipnous cuchia*	Kuchia	Whole body and blood	Treatment of anemia	Raw blood is prescribed to drink and cooked meat is prescribed to eat for the treatment of anemia.	0.32	0.36

02	*Apis cerena*	Mahu Machi	Whole body	Gastric ulcer	Whole honey bee is grinded in water and prescribed to eat for Gastric ulcer.	0.38	0.42
03	*Axis axis*	Harina	Horn	Piles treatment	Burned dear horn smoke is used in piles treatment.	0.87	0.91
04	*Bos gaurus*	Gayala	Biles	Asthma	Bile juice mixed with rice powder and is given twice a day for seven days.	0.39	0.42
05	*Bos indicus*	Gai	Milk	Chronic dysentery	Milk is mixed with *Alstonia scholaris* leaf juice and prescribed for three days for treatment of chronic dysentery.	0.46	0.50
			Urine	treatment of epilepsy	Cow urine is mixed with crushed seed of *Sesbania grandiflora* and prescribed to drink for the treatment of epilepsy.	0.62	0.68
06	*Bubalus bubalis*	Mainshi	Horn	Pre-menstrual pain	Burning buffalo horn ash is prescribed to mix with water to drink for relief of pre menstrual pain.	0.54	0.57
07	*Duttaphrynus melanostictus*	Sukhila Benga	Heat with blood	Bronchial pneumonia	Fresh blood and heart is mixed with clove, cardamom, pepper and a paste is made and prescribed to consume for the treatment of bronchial pneumonia.	0.36	0.41
08	*Cancer paramus*	Kanakanda	Whole body	Blood born diseases	Meat is used for blood born diseases.	0.21	0.27
09	*Canis aureus*	Gadhia	Meat	asthma, paralysis and Arthritis	Meat is used to cure asthma, paralysis and arthritis.	0.23	0.25
10	*Cervus unicolor*	Sambar	Blood	Chronic dysentery	Dry blood is mixed with sugar and administered for 3 days.	0.18	0.21
11	*Clarias batrachus*	Magur macha	Whole body	Wound healing	Cooked with black pepper and prescribed to eat for body ache, wound healing.	0.82	0.86
12	*Columba livia*	Para	Meat	Paralysis	Meat of black pigeon given to patients suffering from paralysis.	0.18	0.21
13	*Crocodylus palustris*	Gumohan Kunbhira	Excreta	Skin diseases	Little quantity of excreta mixed with cocoanut oil and applie locally.	0.11	0.19
14	*Cryptozona bistrialis*	Genda	Whole body	Treatment of impotence	Boiled and prescribed to eat for the treatment of impotence, i.e., to increase sexual power.	0.52	0.60
15	*Elephas maximus*	Hati	Tusk	Skin diseases	Elephant tusk paste made	0.11	0.15

				and Eczema	with coconut oil and is used for 15 days.		
16	*Felis domesticus*	Bilei	Meat	Arthritis	Meat cures arthritis.	0.13	0.16
17	*Hemidactylus flaviviridis*	Jhitipiti	Meat	Body pain	Lizard meat is inserted in a banana for easy swallowing for relieve of various types of pain.	0.62	0.68
18	*Herpestes edwardsii*	'Neola'	Meat	Asthma, Rabies	Boiled meat is prescribed to be taken for the treatment against asthma, Rabies.	0.16	0.21
19	*Heteropneustes fossilis*	'Singi macha'	Whole body	Wound healing	Cooked with black pepper and prescribed to eat for wound healing.	0.82	0.87
20	*Homo sapiens*	Manisha	Urine	Antiseptic effect on wound	Prescribed to use over the skin as it has antiseptic effect on wound.	0.91	0.94
21	*Hystrix indica*	Jhinka	Rectum	Colic pain	The rectum is boiled in water and is given twice a day for seven days.	0.28	0.29
22	*Hystrix indica*	Jhinka	Elementary canal	Prementstrual pain	Alimentary canal is dried and grinded then mixed with palin water to drink for relief of premenstrual pain.	0.23	0.24
23	*Labeo rohita*	Rohi Macha'	Gall bladder	Gastric ulcer	Grind with water and prescribed to eat whole thing against gastric ulcer.	0.77	0.82
24	*Lampyridae spp*	Juljulia poka	Whole body	Stomach ulcer	4/5 raw fire flies prescribed to eat daily for stomach ulcer.	0.48	0.58
25	*Macaca mulatta*	Mankada	Meat	asthma, rheumatism	Meat is used to cure asthma, rheumatism, develops resistance against parasitic infection.	0.77	0.80
26	*Manis crassicaudata*	Bajrakapta	Feather	Piles	The ring is made up from the feather and tied on finger.	0.59	0.61
27	*Melursus ursinus*	Bhalu	Hair, Fat	Fever, Rheumatism	Hair burnt mixed with honey and is given to patient twice a day for three days.	0.14	0.17
28.	*Oecophylla smaragdina*	Kai	Whole body	Respiratory diseases, Anti-inflammatory, and to increase milk for lactating women	Prescribed to eat raw with tamarind for respiratory diseases.	1.0	1.23
29	*Metaphire houletti*	Jia nala	Whole body	Vocal cord infection,	Earthworm is washed properly and boiled with	0.83	0.98

				treatment against piles	water, salt is added and prescribed to consume for the treatment of vocal cord infection, Head portion is burned and grinded then mixed with coconut oil to prepare a paste and the prepared paste is applied topically for treatment of piles.		
30	*Panthera tigris*	Mahabala bagha	Liver, Gallstone, Milk	Courage, Abscesses, Sooth ailments of the eye	The gall stone mixed with the ailments and is taken as a tonic. The liver is eaten to impart courage, milk is given to patient to cure eye.	0.13	0.15
31	*Pavo cristatus*	Mayur	Leg	Ear infection	Legs are burnt and powder is applied locally.	0.43	0.47
32	*Pila globosa*	Genda	Whole body	Better eye sight	Whole body is Cooked and prescribed to eat for better eye sight.	0.62	0.77
33	*Pterocarpus giganteus*	Badudi	Meat	Asthma and Bronchitis	Prepared meat is given to the patient.	0.38	0.41
34	*Periplaneta americana*	Asarapa	Whole body	Asthma, Anti-inflammatory	Wings are removed and washed to be boiled and prescribed to be consumed for the treatment of asthma.	0.91	0.94
35	*Palamnaeus swammerdami*	Kankada Bicha	Whole body	Piles treatment, and Antiseptic	Whole animal is boiled with edible oil for treatment of piles, Ash is used for treatment of wounds.	0.23	0.25
36	*Ptyas mucosa*	Damana	Meat	Body pain	Cooked meat is prescribed to eat for body pain.	0.51	0.54
37	*Pterocarpus giganteus*	Badudi	Blood	To stop vomiting and Gastric disorder	Blood is prescribed to drink to stop vomiting and gastric disorder.	0.38	0.45
38	*Rattus rattus*	Musa	Meat	Production of semen	Meat produces production of semen.	0.18	0.21
39	*Rana*	Pani Benga'	Meat	Treatment of asthma and Respiratory diseases	Meat is cooked and prescribed to eat for the treatment of asthma and respiratory diseases.	0.63	0.67
40	*Ratufa indica*	Gunduchimusa	Meat	Asthma and Respiratory diseases,	Boiled meat is prescribed to be taken for the treatment against asthma.	0.32	0.51
41	*Scapteriscus didactylus*	Kalikatra	Alimentary canal	Worm infection	Raw elimentary canal is prescribed to take with banana for intestinal worm infection.	0.32	0.48
42	*Sus scorofacristatus*	Barha	Teeth	Inflammatory pain	Teeth are washed in water and is drunk twice a day for	0.75	0.82

					seven days.		
43	*Oecophylla smaragdina*	Kai, Katha pimupdi	Whole body	Respiratory diseases, Anti-inflammatory	Prescribed to eat raw with tamarind for respiratory diseases.	1.0	1.23
44	*Strixaluco nivicola*	Pecha	Meat	For strength and virility	Meat promotes strength and virility.	0.21	0.31
45	*Vespa affinis*	Birudi	Whole body	Gastric ulcer	Whole is grinded in water and prescribed to eat for gastric ulcer.	0.38	0.41
46	*Vulpes bengalensis*	Koki Shiala	Meat	Against paralysis	Cooked meat is consumed against paralysis.	0.38	0.42

Table 7. No of animal species of different classes reported for medicinal purposes in Mayurbhanj district of Odisha, India.

Sl. No.	Type of animal	No. of species	Total Animal (%)
01	Mammals	21	46.66
02	Aves	03	6.66
03	Reptiles	03	6.66
05	Amphibians	02	4.44
06	Pisces	04	8.88
07	Invertebrates	05	11.11
08	Insects	05	11.11
09	Arthropoda	02	4.44
	Total	45	

Table 8. Medicinal uses and its percentage from total no. of uses reported in different disease categories in Mayurbhanj district.

Sl. No.	**Name of disease**	**Uses**	**% of total uses**
01	Anemia	02	4.25
02	Gastric ulcer, Gastric disorder	09	19.14
03	Asthma, Bronchitis, Respiratory diseases	10	21.27
04	Epilepsy	02	4.25
05	Gynecological problem	02	4.25
06	Pneumonia	01	2.12
07	Blood born diseases	02	4.25
08	Paralysis	04	8.51
09	Arthritis	02	4.25
10	Antiseptic	07	14.89
11	Treatment of impotence	02	4.25
12	Ear infection	01	2.12
	Total	47	

Many animals have been tested by pharmaceutical companies as sources of drugs to the modern medical science. According to the sample collection, 46 animals are reported which are used as the source of folk medicines in different parts of Mayurbhanj district. The number of animals reported for medicinal purposes in different parts of the district is enough to feel a need to discuss on the use of animals and their products as medicines. Out of 47 uses for variety of diseases from 46 species, 10 are used for respiratory diseases and skin infections, nine are for gastric disorder, two are for anemia, one is for ear infection, two are for treatment of impotence, seven are of antiseptic, two are for arthritis, four are for paralysis, two are for blood born diseases, One is of pneumonia, two uses are for gynecological problem, two are for epilepsy and two uses are for anemia. Out of the above details of the treatment modalities by the local healers of Mayurbhanj district, one of the tribal dominant populations, opines that

still people believe strongly in the traditional method of treatment. Whole flesh or blood of *Amphipnous cuchia* of the phylum *Chordata*, commonly called as "cuchia" in odia, is found to be used against anemia by the local healers of Mayurbhanj district where as Rahman *et al*. (2014) report that fresh blood from *Monopterus cruchia* is used for the treatment of respiratory diseases and anaemic condition at Nagaland. Whole body of the honey bee *Apis cerena* of the phylum *Arthropoda* commonly called as "*mahumachhi*" in Odia is used in the treatment of gastric ulcer. The data have been collected during our study by the traditional healer. Ediriweera & Premarathna (2012) explain most frequently the use of bee species having the potency to treat multiple diseases are *Apis cerena.* Bees after its immediate collection, traditional healers use its whole part for several respiratory diseases like asthma and throat infection. The fresh bees also are utilized for tuberculosis patients, healing of wounds and ulcers. The old bees are used to treat vomiting, diarrhea, arthritis and also against diabetes. The old bees show preservative properties where it is also utilized for preserving meat and fruits. Apart from medicinal properties, researchers also have explored its honey for cosmetic properties as one of its beneficial uses where people have been utilizing this for preparing facial washes, skin moisturizers, hair conditioners and in treatment of pimples.

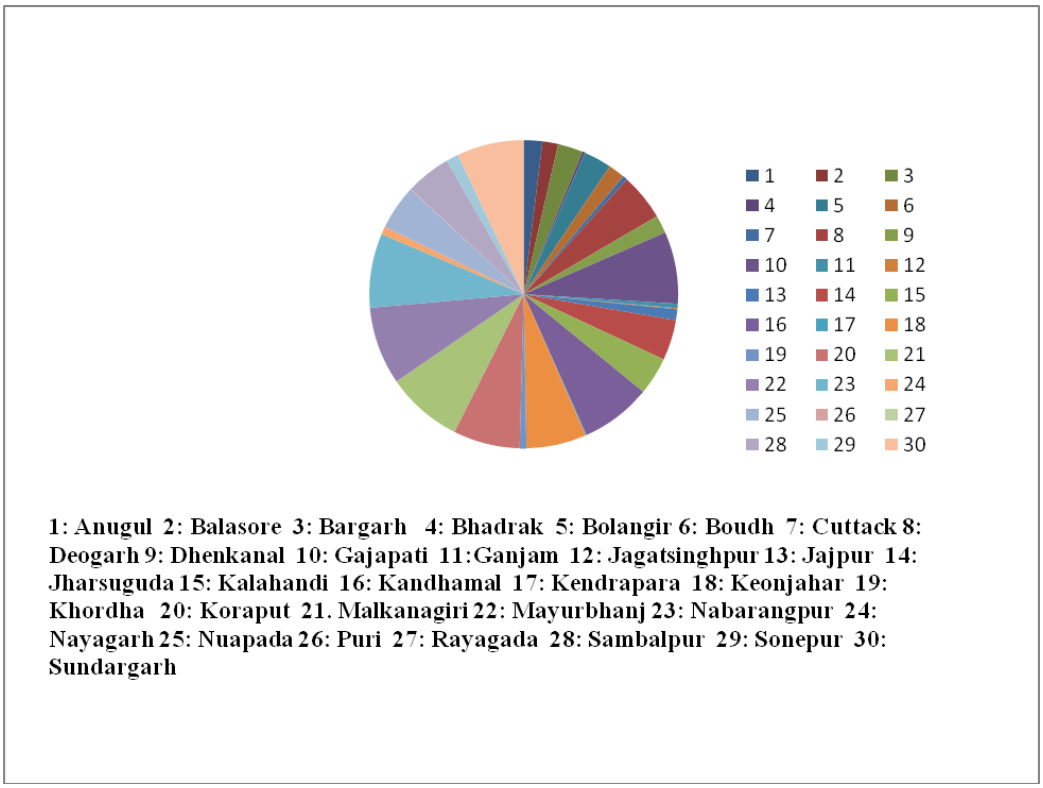

Figure 1. District-wise % of Scheduled Tribe population in Odisha, 2011.

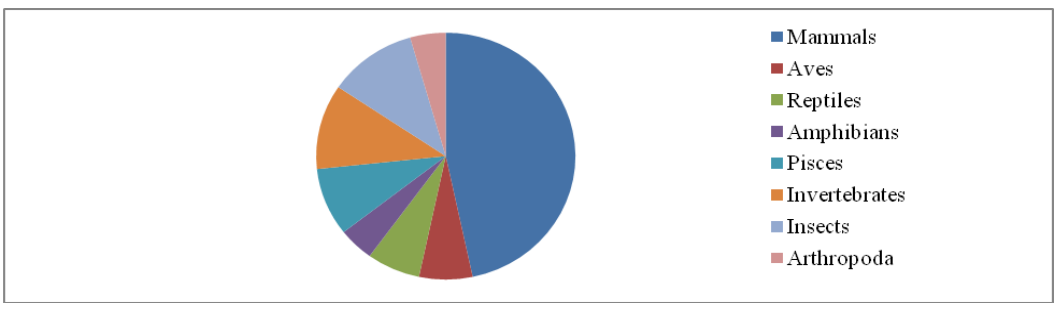

Figure 2. Total animal and number of species of different classes (Per cent) reported for medicinal purposes in Mayurbhanj district.

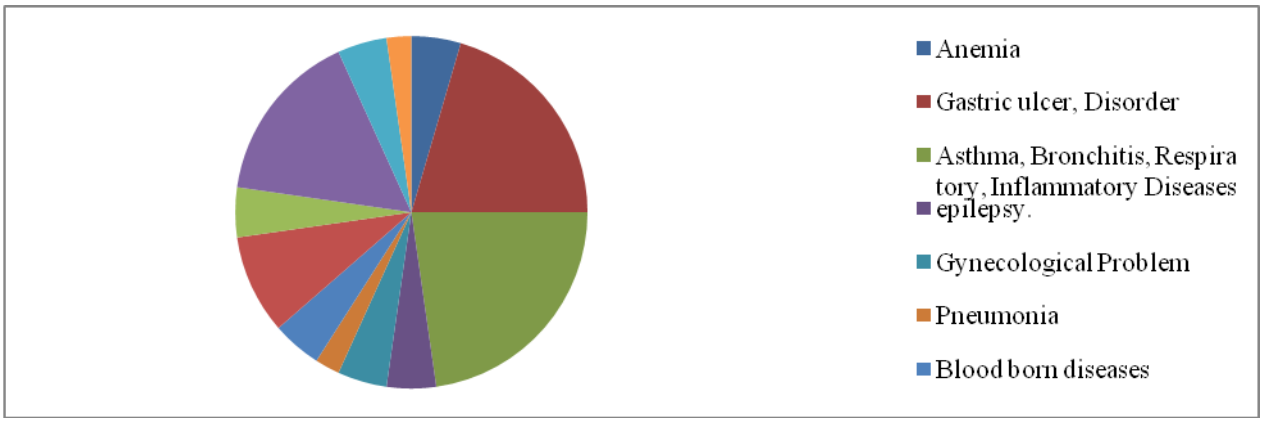

Figure 3. Medicinal uses and its percentage from total number of uses reported in different disease categories in Mayurbhanj district.

In the study area, bile from bison (*Bos gaurus)* of the phylum *Chordata* commonly called as "gayala" in odia had cited as a medicine to prevent asthma. According to an ethnozoological study in Africa conducted by Oyedeji-Amusa *et al*. (2016), the urine and bile of bison (*Bos gaurus)* is used in the treatment of analgesic, rheumatism, diabetes and hypertension. The blood of the frog (*Duttaphrynus melanostictus)* of the phylum *Chordata*, class-Amphibia commonly called as "benga" is also being used to treat bronchial pneumonia by the tribal people. Mudgal & Pal (1980) report that lyophilisate skin extract of frog (*Duttaphrynus melanostictus*) is used as an antifungal agent against *C. albicans*, *M. gypseum* and *T. mentagrophytes*. In our study area, the blood of Sambar (*Cervus unicolor)* of the phylum *Chordata* is used in chronic dysentery where as the traditional healers of Rajasthan use flesh of antler of *Cervus unicolor*. Infact, Sambar is the state animal of Odisha. They soak the antler in water from which a paste is prepared to utilize for a variety of eye aliments also. Interestingly, in this region maximum number of traditional healers do collect cockroaches (*Periplaneta americana)* of the phylum Arthropoda and class Insecta commonly called as "asarapa" also red ants (*Oecophylla smaragdina)* of the phylum Arthropoda and class Insecta commonly called as "kai" are prescribed these frequently for various types of inflammation, skin diseases and to the patients suffering from chronic illness like asthma, cancer etc. as a common medicament. It is suggested that there is ample of opportunity for an ethnozoologist to take the challenge to trace the chemical constituents from the particular parts used and establish its pharmacological activity for a healthy society.

CONCLUSION

The district Mayurbhanj is known for its rich tribal cultural heritage, mining, and mineral resources. These changes are observed in the literacy status, educational achievements, and their employment status. The scientific knowledge pertaining to the use of animal species is an important factor even for the conservation of wildlife. Since the information on ethnozoology is very inadequate, it is felt pertinent to analyze, interpret and document this aspect. Possibly this documented material may ignite the young therapeutic researchers to examine and identify scientifically, correlate and unveil the unexplored truth between the claim of traditional healer and actual experimental findings. The scientific evidence will certainly be helpful to the regulatory authority to restrict the traditional healers not to exploit any species in the name of only ancestral claim. This may also help in better understanding of traditional zootherapeutic medicine, its interrelationship with the socioeconomic and ecological values of the region, biodiversity conservation, and management.

ACKNOWLEDGMENTS

The authors express sincere thanks to the Head of the Post-graduate Department of Zoology, Utkal University, VaniVihar, Bhubaneswar, Odisha for providing the facilities to carry out this research work. Thanks are also due to the museum of SC and ST, Govt. of Odisha for providing information on tribes, tribal culture and cultural practice relating to health.

REFERENCES

Adeola, M.O. (1992). Importance of wild animals and their parts in the culture, religious festivals, and traditional medicine, of Nigeria. *Environmental Conservation*, *19*(2), 125-134.

Alvard, M.S., Robinson, J.G., Redford, K.H., & Kaplan, H. (1997). The sustainability of subsistence hunting in the neotropics: La Sustentabilidad de la Caza de Subsistencia en el Neotrópico. *Conservation Biology*, *11*(4), 977-982.

Alves, R.R., Mendonça, L.E., Confessor, M.V., Vieira, W.L., & Lopez, L.C. (2009). Hunting strategies

used in the semi-arid region of northeastern Brazil. *Journal of Ethnobiology and Ethnomedicine*, *5*(1), 12.

Alves, R.R., & Rosa, I.L. (2007). Zootherapy goes to town: The use of animal-based remedies in urban areas of NE and N Brazil. *Journal of Ethnopharmacology*, *113*(3), 541-555.

Alves, R.R., Souto, W.M., & Barboza, R.R. (2010). Primates in traditional folk medicine: a world overview. *Mammal Review*, *40*(2), 155-180.

Alves, R. (2012). Relationships between fauna and people and the role of ethnozoology in animal conservation. *Ethnobiology and Conservation 1(2), 6-11*.

Alves, R.& Albuquerque, U.P. (2012). Ethnobiology and conservation: why do we need a new journal? *Ethnobiology and Conservation 1(1), 1-6*.

Alves, R.R. N., Rosa, I.L., Albuquerque, U.P., & Cunningham, A. B. (2013). Medicine from the wild: an overview of the use and trade of animal products in traditional medicines. *Animals in Traditional Folk Medicine 1(1)*, 25-42.

Anadón, J. D., Giménez, A., & Ballestar, R. (2010). Linking local ecological knowledge and habitat modelling to predict absolute species abundance on large scales. *Biodiversity and Conservation*, *19*(5), 1443-1454.

Anonymous (2015). Census of India, 2011. Provisional tribal population totals – Orissa.Government of India, Ministry of Home Affairs, Directorate of Census Operations, Orissa, Janpath, Unit-IX, Bhubaneswar-751 022, 1(1),64-69.

Anonymous (2011). Census of India, 2011. Provisional tribal population totals – Orissa.Government of India, Ministry of Home Affairs, Directorate of Census Operations, Orissa, Janpath, Unit-IX, Bhubaneswar-751 022, 1(1),23-38.

Baker, F. C. (1941). A study in ethnozoology of the prehistoric indians of Illinois. *Transactions of the American Philosophical Society*, *32*(1), 51-77.

Chinlampianga, M., Singh, R. K., & Shukla, A. C. (2013). Ethnozoological diversity of Northeast India: Empirical learning with traditional knowledge holders of Mizoram and Arunachal Pradesh. *Indian Journal of Traditional Knowledge*, *12(1)*, 18-30.

Ediriweera, E., & Premarathna, N. (2012). Medicinal and cosmetic uses of Bee's Honey–*A review*. *Ayurvedic Journal*, *33*(2), 178.

Mudgal, V., & Pal, D. (1980). Medicinal plants used by tribals of Mayurbhanj (Orissa). *Nelumbo*, *22*(1-4), 59-62.

Naik, S. D., & Doraiswamy, L. (1998). Phase transfer catalysis: chemistry and engineering. *AIChE Journal*, *44*(3), 612-646.

Oyedeji Amusa, M. O., Ojuromi, O. T., & Ashafa, A. O. (2016). Ethnoveterinary survey of tradomedical importance of Bos taurus L urine, bile and dung in Nigeria and South Africa. *Tropical Journal of Pharmaceutical Research, 15*(8), 1807-1813.

Prabhu, S., Vijayakumar, S., Yabesh, J. M., Ravichandran, K., & Sakthivel, B. (2014). Documentation and quantitative analysis of the local knowledge on medicinal plants in Kalrayan hills of Villupuram district, Tamil Nadu, India. *Journal of Ethnopharmacology*, *157*, 7-20.

Rahman, S., Choudhury, J., Dutta, A., & Kalita, M. (2014). Eel ichthyofauna of Assam in folklore therapeutic practices. *International Journal of Interdiscipilinary Multidiscilipinary Studies*, *1*(5), 273-276.

Sahoo, L. K. (2011). Socio-economic profile of tribal populations in Mayurbhanj and Keonjhar districts. *Orissa Review 1*(1), *63*-68.

Vijayakumar, S., Prabhu, S., Yabesh, J.M., & Pragashraj, R. (2015). A quantitative ethnozoological study of traditionally used animals in Pachamalai hills of Tamil Nadu, India. *Journal of Ethnopharmacology*, *171*, 51-63.