Ethnozoological study of medicinal animals and animals’ products used by traditional medicinal practitioners and indigenous people in Motta city administration and Hulet Eju Enessie District, East Gojjam, Northwest Ethiopia

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ABSTRACT

Background: In Ethiopia, many ethnic communities use traditional/indigenous medicine for primary health care. However, this indigenous medicinal practice is being neglected and continued to be lost due to poor documentation as they are transferred from generation to generation through oral tradition. Therefore, this ethnozoological study aimed to assess and document the medicinal use of animals and animals’ products used by traditional medicinal practitioners and indigenous people in Motta city administration and Hulet Eju Enessie Districts, East Gojjam Zone, Ethiopia.

Methods: Cross-sectional ethnozoological survey was conducted using a Semi-structured questionnaire among purposively selected respondents in Motta city administration and Hulet Eju Enessie District, East Gojjam Zone, Ethiopia from September 2020 to June 2021 GC. The ethnozoological data were analyzed using SPSS version 26 and Microsoft Excell Spreadsheet. Fidelity level, use-value, and informant consensus factor were determined.

Results: A total of 25 animal species were reported to be used for the treatment of different ailments by 33 informants. The majority of animals (64%) were mammals followed by birds (16%). The fidelity level ranged from 18.2 (Hyena for bad spirit) to 100% (stingless bee for asthma, Tiger for rabies virus, Whisper for nightmare).

Conclusion: This study showed the wide use of medicinal animals and their parts/products for meeting the primary healthcare needs of the community in the study area. Therefore, this ethnozoological medicinal knowledge needs to be integrated with modern medicine to use animals/animals’ products as a potential source of effective drugs for different ailments.

1. Introduction

1.1. Background

People with different cultures across the world apply their indigenous healing knowledge to prevent and treat various ailments using animal and plant derived remedies [1]. As the majority of the world population primarily relies on traditional medicinal remedies and medical practices for attaining primary health care needs, indigenous medicinal knowledge is an important alternative in the health care delivery system [2]. Different parts and products of various species of both wild and domestic animals are used for the preparation of curative, protective, and preventive remedies for the management of various ailments [3].

Many bioactive compounds are obtained following scientific validation of traditional medicinal remedies used by traditional medicinal practitioners and indigenous people. These bioactive compounds are the lead compounds for many drugs used in the health care system [4]. For example, clinically important drugs like insulin, hormonal contraceptives, heparin, and most antiviral vaccines are isolated and obtained from animals namely pork, bovine, and horse [5].

Zootherapy is highly practiced in traditional medical practices worldwide [6, 7]. Due to the longer period of practice, traditional...
medicine using animal based remedies is deeply integrated with the culture of Ethiopians [8]. However, this medicinal practice is poorly documented resulting in the loss and underestimation of its value by the younger generation compared to ethnobotany [6]. In addition, no study was conducted on the medicinal use of animals and their parts or products in the study area. Therefore, this ethnozoological study aimed to assess and document the medicinal use of animals and animals’ products by traditional medicinal practitioners and indigenous people in Mota city administration and Hulet Eju Enessie Districts, East Gojjam Zone, Ethiopia.

2. Methods

2.1. Study area description

The study was conducted in Motta city administration and Hulet Eju Enessie District, East Gojjam Zone, Amhara Regional State, Ethiopia. Motta city administration is located 371 km Northwest of Addis Ababa and 118.9 km Southwest of Bahir Dar, the regional capital. There are six urban kebeles in Motta city administration and 29 rural and 1 urban kebele in Hulet Eju Enessie District. According to the information obtained from East Gojjam Zone Health Bureau, there are 48 licensed traditional medicinal practitioners and knowledgeable indigenous people compared to other districts of the East Gojjam Zone. The Kebeles were purposively selected because of their high number of registered traditional medicinal practitioners and knowledgeable indigenous people compared to other districts of the East Gojjam Zone. This study was conducted from September 2020 to June 2021GC.

2.2. Selection of study sites

The study was conducted in all six kebeles of Motta city administration and purposively selected six kebeles of Hulet Eju Enessie District (Keraniyo, Ayen-birhan, Hibre-Selam, Abiyot-Selam, Shigie, and Tiru-Selam), East Gojjam, Amhara Regional State, Ethiopia. The Kebeles were purposively selected because of their high number of registered traditional medicinal practitioners and knowledgeable indigenous people compared to other districts of the East Gojjam Zone. This study was conducted from September 2020 to June 2021GC.

2.3. Sampling and data collection

All traditional medicinal practitioners and selected indigenous people older than 18 years, practicing traditional medicine, living in the selected kebeles of the study area, and available during the data collection period were taken as the study population. Indigenous people recognized as knowledgeable (‘Experts’) by the local community for their knowledge of traditional medicinal services were purposively selected with the help of community leaders, health extension workers, and local authorities of the respective kebeles. In addition, a snowball sampling technique was also employed to identify other potential informants from the people living in selected kebeles. Ethnozoological data (Local name, indication, parts of the animal used, mode of preparation, route of administration) were collected from each informant using a semi-structured questionnaire.

2.4. Quality assurance of the study

A semi-structured questionnaire was prepared in English version by reviewing different literatures. To maintain its originality, the questionnaire was translated into the local language (Amharic) from its English version, and then back to English. A pretest was conducted on September 2020 among five informants in Yejube town, East Gojjam Zone Amhara Regional State Ethiopia to test the data collection checklist. In addition, one-day training was given for data collectors by the investigators. Supervision was made during the data collection period. Data were checked for completeness and consistency throughout the data collection period.

2.5. Data analysis

Data were cleaned, entered, and analyzed using SPSS version 26 and Microsoft Excel spreadsheet. Quantitative data were analyzed with descriptive statistics. From the collected data, fidelity level [9], informants’ Consensus Factor [10], and use-values [11] were determined based on the following formula.

\[
\text{Fidelity level (FL)} = \left( \frac{\text{NP}}{N} \times 100 \right) \%
\]

(1)

Where Np is the number of informants that mentioned the specific animal species used to treat certain ailments and N is the total number of the informants who utilized the animals as medicine for treating any given ailments.

\[
\text{Informants’ Consensus Factor (ICF)} = \left( \frac{(\text{Nur} - \text{Nt})}{(\text{Nur} - 1)} \right)\times 100
\]

(2)

Where Nur is the number of use reports from informants for a particular animal-use category and Nt is the number of taxa or species that are used for that animal-use category for all informants. ICF Values range between 0 and 1, where ‘1’ indicates the highest level of informant consent.

\[
\text{Use – values (UV)} = \frac{\sum_{i=1}^{n} Uv_i}{N}
\]

(3)

Where Uvi is the number of use reports cited by the informants for that particular species and N is the total number of respondents interviewed.

2.6. Ethical considerations

Data was collected after getting permission letter from research technical evaluation committee of Haddis Alemayehu cultural studies institute and the respective health office of Motta city administration and Hulet Eju Enessie district. All the study participants were informed about the purpose of the study; their right to refuse was maintained. Ethical conduct will be maintained throughout the data collection period. Privacy and confidentiality were ensured throughout the study period.

3. Results

3.1. Sociodemographic characteristics of informants

In this study, 33 informants participated of which 32 (97%) were Male and 1 (3%) Female. The majority of informants (54.5%) were in the age group of 55–64 years followed by 18.2% aged 65 years and older. Most of the informants (84.8%) were married. The majority of the informants 23 (67.7%) live in the rural area whereas 10 (30.3) live in urban areas. More than half of the informants (57.6%) can’t read and write. The majority of the informants 20 (60.6%) are farmers who provide private traditional health services (Table 1).

3.2. Ethnozoological data

The majority of the informants 11 (33.3%) obtain their knowledge on the medicinal use of animal and animal products from their father. Most of the informants (69.7%) were interested to transfer their medicinal knowledge to the next generation (Table 2).

3.3. Class of animals medicinally used in the study area

In the present study, A total of 25 species that belong to five classes (Mammals, Bird, Reptiles, Amphibia, and insects) were used for the management of 38 health conditions. Mammals were the most frequently (64%) used medicinal animals by traditional medicinal practitioners and indigenous people in the study area (Table 3). Among the total medicinal
animals/products used traditionally, 18 species (72%) were from wild sources as compared to those obtained domestically (Table 4).

3.4. Animal parts/products used as traditional medicine

In the present study, meat or fatty meat (27.5%) was highly used followed by that of the liver (7.5%), skin (7.5%), and excreta of animals (7.5%) (feces and urine). In addition, honey, bone, whole body, blood, teeth, bile, and milk were reported to have medicinal values (Table 5).

3.5. Modes of preparations of animals and animals’ products remedy in the study area

The study revealed that most of the animals or their products are used directly (36.3%) without adding other ingredients or without any further modification of the natural resources. In addition, mixing with other ingredients, preparing in the form of soup/stew and drying methods respectively accounted for 21.3%, 10%, and 8.8% of the mode of preparation of remedies used by the traditional medicinal practitioners and indigenous people in the study community (Table 6).

3.6. Routes of application medicinal animal remedies at the study area

The medicinal animal products or treatment remedies were reported to be used in different ways of administration. Half of the prepared animal medicinal remedies are administered orally followed by the topical routes (30.8%) and inhalational routes (14.1%) (Figure 1). The preparation of amulet, sitting on, tying, or hanging off the animal products were reported to be the least method using medicinal animal remedies.

3.7. Relative importance and fidelity level medicinal animal or animal products

In the present study, hyena (36%) was the most frequently used animal species to prepare the animal remedies for different ailments in the study area followed by that of snake (18%). The other mostly used species next to hyena and snake were porcupine, goat, and hen which accounted equally (15%) to the animal remedies used for the treatment of different ailments (Table 7).

3.8. Fidelity level of a medicinal animal or animal products

The present study revealed that fidelity level ranges from 18.2 (Hyena for bad spirit) to 100% (for species that are used to prepare remedies for specific disease). The animal species with 100% fidelity level for the most reported ailments were Honey bees, stingless bees, whisper, and Tiger (Table 8).

3.9. Informant consensus factor

In this study, the level of agreement between interviewees over which animal to use for each illness category was determined using the Informant consensus factor (ICF). This study revealed that informants have a high level of agreement (ICF = 1) in the treatment of bad spirit, Tuberculosis, Impotency, Chills (Wurch), Measles, and postpartum hemorrhage. However, the informants have a high level of heterogeneity (ICF = 0.5) in the treatment of rabies and asthma (Table 9).
| Local name (Amharic) | English name | Scientific name | Habitat | Indication | Part used | Condition/preparation | Dosage | Route |
|---------------------|--------------|-----------------|---------|------------|-----------|----------------------|--------|-------|
| Sew                 | Human        | *Homo sapiens*   | Domestic| Evil eye   | Faeces     | Drying the faeces of the evil man and burning | ————  | Inhalational |
|                     |              |                 |         | Wound      | Faeces and urine | Faeces and urine mixed with Goat dung and cabbage are then stored in a room for a week before use | Applying the mixture to the affected area | Topical |
|                     |              |                 |         |            |           | Faeces and urine mixed with sheep dung and left to stand for one week | Applied on the wound for one week | Topical |
| Jib                 | Hyena        | *Crocuta crocuta* | Wild    | Evil eye   | Skin      | Drying the skin and hanging at a place in the house | ————  | Hanging on the house |
|                     |              |                 |         |            | Dried skin | Letting the victim sit on the dried skin | Sitting on the skin |
|                     |              |                 |         | Liver      | Liver      | Liver mixed with plants like *Cucumis fistulosa* (*yemdir embuay*), *Artemisia abyssinica* (*Chiqgun*), and *Ajuga integrifolia* (*Etse libawit*) | Smelling a spoonful of the preparation once | Inhalational |
|                     |              |                 |         |            | Left leg meat | Drying the meat from the left leg | Tying on the neck | Tying |
|                     |              |                 |         | Epilepsy   | Skin       | Piece of skin | Fumigating the patient with smoke of burned skin when required | Inhalational |
|                     |              |                 |         | Bad spirit | Bone       | Burning the bone | Smoking the bone | Inhalational |
|                     |              |                 |         | Mental illness | Brain and eye | Brain and eye mixed with *Ajuga integrifolia* (*Etse libawit*) | Smelling the preparation | Inhalational |
|                     |              |                 |         | Eye disease | Eye        | Drying and grinding to powder | Applying the preparation on the affected eye | Topical |
| Jart                | Porcupine    | *Hystrix cristata* | Wild    | Tuberculosis | Meat   | Cooking the fresh meat | Eating the cooked meat for three days | Oral |
|                     |              |                 |         | Asthma     | Meat      | Preparing wat from the meat | Eating the stew once per day for three days | Oral |
|                     |              |                 |         | Arthritis  | Meat      | Preparing the meat in the form of stew | Eating the stew with injera once a day for 3 days | Oral |
|                     |              |                 |         | Lung and kidney disease | Meat | The meat dried and mixed with her meat to prepare stew | Eating with half injera once | Oral |
| Lam                 | Cow          | *Bos Taurus*     | Domestic| Malaria    | Butter/cheese | Mixing with *Ruta chalapensis* (*tenadam*), garlic, and sugar cane | Drinking two glasses per day | Oral |
|                     |              |                 |         | Wound      | Urine     | ———— | Washing the wound with urine | Topical |
|                     |              |                 |         | Abdominal pain | Milk | Fresh milk | Drinking fresh milk | Oral |
| Fiyel               | Goat         | *Capra aegagrus Hircus L.* | Domestic| Anxiety    | Tongue | Eating the fresh tongue of the goat | ————  | Oral |
|                     |              |                 |         | Febrile illness (mich) | Bile | Drinking the bile | ————  | Oral |
|                     |              |                 |         | Hemorrhoid | Gastric content | Fresh gastric content mixed with water | Washing the affected area with the preparation for one day | Topical |
|                     |              |                 |         | Scabies    | Stomach   | The stomach with its content soaked in a mixture of lemon, orange, and lemongrass | Placing the affected body in the mixture for three days | Topical |
|                     |              |                 |         | Anemia     | Blood     | Blood mixed with sugar | Drinking one glass for a day | Oral |

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| Local name (Amharic) | English name | Scientific name | Habitat | Indication | Part used | Condition/preparation | Dosage | Route |
|----------------------|--------------|-----------------|---------|------------|-----------|-----------------------|--------|-------|
| Zinjero Monkey       | Papio anubis | Wild            | Pneumonia | Lung | Eating the fresh lung | Oral |
|                      |              |                 | Impotency | Fatty meat | The meat mixed with the leaf and root of both *Schiffiera abyssinica* (‘geten’) and *Cucumis ficifolia* | Eating the mixture | Oral |
|                      |              |                 | Fracture | Fatty meat | The meat mixed with *Cucumis ficifolia* | Eating the mixture | Oral |
|                      |              |                 |          |             |            | Gisting the fracture site with the fatty meat for three days | Topical |
| Tota Vervet monkey   | Chlorocebus pygerythrus | Wild | Body swelling | Liver | Eating the fresh liver | Oral |
|                      | Nib Bee      | Apis mellifera | Wild    | Chills (wurch) | Honey Mixing honey with garlic and water | Drinking three cups a day | Oral |
|                      | Tazma nib Stingless bee | Trigona spp | Wild | Asthma | Honey (tasma) | Taking a spoonful of honey once a day for two days | Oral |
|                      |              |                 |          |             |            | Warming honey with water | Drinking one glass of the preparation for one day | Oral |
|                      |              |                 |          |             |            | One carafe per day | Oral |
| Zendo Python         | Python spp   | Wild            | Tumor ('neqersa') | Fatty meat | Fresh meat | Applying on the tumor for 7 days | Topical |
|                      |              |                 | Swelling | Fatty meat |            | Applying the fatty meat on the area once a day for two days | Topical |
|                      |              |                 | Wound    | Fatty meat |            | Applying the fatty meat on the area | Topical |
| Ehab Snake           | Snake Spp    | Wild            | Tumor ('neqersa') | Whole | Applying the whole snake on the tumor | Topical |
|                      |              |                 | Mental illness | Head | Drying and grinding | Applying the preparation on the wound | Topical |
|                      |              |                 | Nightmare in babies | Head | The head dried and powdered wrapped clean cloth. An amulet is prepared using Fox skin | Tying on the neck | Inhalational |
| Doro Chicken         | Gallus gallus domesticus | Domestic | Fracture | Meat | Preparing stew from the meat | Drunking the stew | Oral |
|                      | Kidney disease | Meat | Preparing stew from the meat of hen and Porcupine | Eating the stew with injera | Oral |
|                      | Eczema ('chife') | Eggs | Powdered eggshell mixed with cow milk and 3 lemons | The preparation applied to the affected area. | Topical |
|                      | Infection on the sole (yemdir mich) | Fatty meat | Melting the fat on the affected sole by applying heat | Topical |
|                      | Cough | Egg | Fresh egg Yolk | Taking yolk of two eggs twice daily for five days | Oral |
| Gurt Frog            | Afritulus eneticola | Wild | Loss of consciousness due to postpartum hemorrhage | Whole | The frog alive is placed on the chest of the mother | Topical |
| Eshkukula Whisper    | Gazella sommeringii | Wild | Nightmare | Heart | Fresh heart meat used | Three pieces of fresh meat for a day | Oral |
| Midako gazelle       | Gazella sommeringii | Wild | Kidney disease | Meat | Eating the dried meat for three days | Oral |
|                      | Rabies virus | Meat | Preparing stew with Tiger meat | Eating the stew with one injera once a day for a week | Oral |
| Ahya Donkey          | Equus asinus | Domestic | Ringworm | Milk | Fresh milk from a donkey similar to its offspring in color or sex | Drinking the milk for five days | Oral |
|                      | Measles | Milk |            |            | Drinking the milk | Oral |

(continued on next page)
According to World Health Organization (WHO) report, about 80% of the world’s people rely primarily on traditional medical practices where the use of animals for medicinal purposes is significant [2]. Ethiopia is known for having wide climatic and ecologic conditions which possess a wide range of fauna and flora of different species that are used for medicinal purpose [3]. In Ethiopia, more than half of the human population depends on traditional medicine for meeting their primary health care needs [12].

In the present ethnozoological survey 25 animal species and their parts/products that belong to a class of mammals, birds, reptiles, amphibians, and insects were reported to be used for the treatment of 38 kinds of health conditions by traditional medicinal practitioners and indigenous people of Motta city administration and Hulet Eju Enessie District. This finding is in line with a study conducted in the semi-arid

| Table 4 (continued) |
|---------------------|
| Local name (Amharic) | English name | Scientific name | Habitat | Indication | Part used | Condition/preparation | Dosage | Route |
| Qebero Fox | Vulpes vulpes | Wild | Epilepsy | Teeth | Holding the teeth on the mouth | Oral |
| | | | Postpartum hemorrhage | Skin | Preparing amulet from dried skin using a red pen | Tying |
| | | | Menta illness | Teeth | Holding the teeth on the mouth or fumigating the patient | Oral or Inhalational |
| Bere ox Bos taurus Domestic | Anemia | Liver | Fresh liver | Eating the fresh liver | Oral |
| Yeleti wolf Bat Cynopterus sphinx Wild | Affection | Whole | Dried meat | Eating one piece of dried meat for two days | Oral |
| | Liver disease | Meat and bone | After drying and grinding the powder mixed with water, oil, and pepper | Drinking one coffee cup once | Oral |
| Beg Sheep Ovis aries Domestic | Social phobia | Bile | Fresh bile | Drinking the bile | Oral |
| | Anemia | Blood | Fresh blood mixed with sugar | Drinking the fresh blood | Oral |
| Ses klipspringer Oreotragus oreotragus Wild | Heart failure | Liver | Fresh liver | Eating the freshly sliced liver once a week for three weeks | Oral |
| Dikula Impala | Infection on the sole | Fatty meat | Melting the fat on the affected sole by applying heat | Topical |
| Debenie Pigeon Columba arquatrix Wild | Burn | Blood | Applying the blood on the burned surface | Topical |
| Qoqe Partridge Pternistis erckelii Wild | Asthma | Meat | Preparing soup | Drinking the soup | Oral |

| Table 5. Proportions of Parts/products of medicinal animals used in the study area, 2021. |
|---------------------|
| S.No | Parts/product of animals | Frequency | Percentage |
| 1 | Meat or fatty meat | 22 | 27.5 |
| 2 | Liver | 6 | 7.5 |
| 3 | Skin | 6 | 7.5 |
| 4 | Excreta of animals (urine, feces) | 6 | 7.5 |
| 5 | Bone or bone marrow | 4 | 5.0 |
| 6 | Honey or Tasma honey | 5 | 6.25 |
| 7 | Whole body | 4 | 5.0 |
| 8 | Blood | 3 | 3.8 |
| 9 | Teeth | 3 | 3.8 |
| 10 | Bile | 2 | 2.5 |
| 11 | Egg | 2 | 2.5 |
| 12 | Head | 2 | 2.5 |
| 13 | Others | 15 | 18.75 |

N.B: Others include kidney, bone and meat, eye, horn and nail, heart, lung, stomach, tongue, brain and eye, butter/cheese, gastric content which occurs in a unit frequency.

| Table 6. Mode of preparation of medicinal animal/animals’ products at the study area, 2021. |
|---------------------|
| S.No | Mode of preparation | No of preparation | Percentage |
| 1 | Direct use | 29 | 36.3 |
| 2 | Mixing | 17 | 21.3 |
| 3 | Preparing soup or stew | 8 | 10 |
| 4 | Drying | 7 | 8.8 |
| 5 | Warming or melting | 4 | 5.0 |
| 6 | Drying, powdering and mixing other ingredients | 3 | 3.6 |
| 7 | Drying and powdering | 3 | 3.6 |
| 8 | Drying and smoking/burning | 7 | 8.8 |
| 9 | Cooking | 2 | 2.5 |

known for having wide climatic and ecologic conditions which possess a wide range of fauna and flora of different species that are used for medicinal purpose [3]. In Ethiopia, more than half of the human population depends on traditional medicine for meeting their primary health care needs [12].

In the present ethnozoological survey 25 animal species and their parts/products that belong to a class of mammals, birds, reptiles, amphibians, and insects were reported to be used for the treatment of 38 kinds of health conditions by traditional medicinal practitioners and indigenous people of Motta city administration and Hulet Eju Enessie District. This finding is in line with a study conducted in the semi-arid

4. Discussion

According to World Health Organization (WHO) report, about 80% of the world’s people rely primarily on traditional medical practices where the use of animals for medicinal purposes is significant [2]. Ethiopia is
Figure 1. Routes of administration for medicinal preparations of animals and animal products used by traditional medicinal practitioners and indigenous people at Motta and Hulet Eju Enessie Districts, 2021. NB: Others include tying, hanging, and sitting on animal remedies.

Table 7. Use-value of medicinal animal species for treating the commonly reported diseases in Motta and Hulet Eju Enessie, 2021.

| S. No | Scientific name | English name | Local name (Amharic) | ∑UVi | UVi | % UVi |
|-------|-----------------|--------------|----------------------|-------|------|-------|
| 1     | Crocaca crocata | Hyena        | Jib                  | 12    | 0.36 | 36    |
| 2     | Snake Spp       | Snake        | Elab                 | 6     | 0.18 | 18    |
| 3     | Hystrix cristata| Porcupine    | Jart                 | 5     | 0.15 | 15    |
| 4     | Capra aegagrus  | Goat         | Fiyel                | 5     | 0.15 | 15    |
| 5     | Gallus domesticus| Chicken     | Doro                 | 5     | 0.15 | 15    |
| 6     | Homo sapiens    | Human        | Sew                  | 4     | 0.12 | 12    |
| 7     | Bos Taurus      | Cow          | Lam                  | 4     | 0.12 | 12    |
| 8     | Papij Anaith | Olive Baboon | Zingero              | 4     | 0.12 | 12    |
| 9     | Python spp      | Python       | Zendo                | 4     | 0.12 | 12    |
| 10    | Vulpes vulpes   | Fox          | Qebero               | 4     | 0.12 | 12    |
| 11    | Trigona spp     | Stingless bee| Tazma nib            | 3     | 0.09 | 9     |
| 12    | Crocaycrocycay  | Donkey       | Ahya                 | 3     | 0.09 | 9     |
| 13    | Bos Taurus      | Ox           | Bere                 | 3     | 0.09 | 9     |
| 14    | Apis mellifera  | Bee          | Nib                  | 2     | 0.06 | 6     |
| 15    | Whisper         | Eshkokula   | 2                    | 0.06  | 6     |
| 16    | Gazella sommeritigii | gazelle | Midoiko | 2 | 0.06 | 6 |
| 17    | Panthera pardus | Tiger       | Nebir                | 2     | 0.06 | 6     |
| 18    | Cynopterus sphinx| Bat         | Yeelit wol           | 2     | 0.06 | 6     |
| 19    | ovus aries     | Sheep        | Beg                  | 2     | 0.06 | 6     |
| 20    | Chlorella      | Vervet monkey| Tota                | 1     | 0.03 | 3     |
| 21    | Africola emeticola | Frog | Gurt         | 1     | 0.03 | 3     |
| 22    | Oreotragus oreotragus | klipspringer | Ses         | 1     | 0.03 | 3     |
| 23    | Asyrcerus melampus | Impala   | Dikula              | 1     | 0.03 | 3     |
| 24    | Columba arguraxis| Pigeon     | Debenie              | 1     | 0.03 | 3     |
| 25    | Pteranthus erckelli | Partridge | Qoqe | 1     | 0.03 | 3     |

Table 8. Fidelity level of medicinal animal species for treating the commonly reported diseases in Motta and Hulet Eju Enessie, 2021.

| S. No | Animal species | Indication | Number of informants for the indication | Total number of informants using the animals/products | Fidelity level |
|-------|----------------|------------|----------------------------------------|---------------------------------------------------|---------------|
| 1     | Human          | Wound      | 3                                      | 4                                                  | 75.0          |
| 2     | Hyaen          | Bad spirit  | 2                                      | 11                                                 | 18.2          |
| 3     | Hyaen          | Evil eye    | 6                                      | 11                                                  | 54.5          |
| 4     | Porcupine      | Tuberculosis| 2                                      | 5                                                   | 40.0          |
| 5     | Cow            | Wound       | 2                                      | 4                                                   | 50.0          |
| 6     | Olive baboon   | Impotency   | 2                                      | 4                                                   | 50.0          |
| 7     | Honey bee      | Chills (wurch) | 2                                      | 2                                                   | 100.0         |
| 8     | Stingle bee    | Asthma      | 3                                      | 3                                                   | 100.0         |
| 9     | Python         | Tumor (neqersa) | 2                                      | 4                                                   | 50.0          |
| 10    | Snake          | Tumor (neqersa) | 4                                      | 6                                                   | 66.7          |
| 11    | Whisper        | Night mare  | 2                                      | 2                                                   | 100.0         |
| 12    | Donkey         | Measles     | 2                                      | 3                                                   | 66.7          |
| 13    | Fox            | Postpartum hemorrhage | 2                                      | 4                                                   | 50.0          |
| 14    | Tiger          | Rabies virus | 2                                      | 2                                                   | 100.0         |

Table 9. Informant consensus factor for the common indications that the medicinal animals and animals’ products used by traditional medicinal practitioners and indigenous people at Motta and Hulet Eju Enessie districts, 2021.

| S.No | Indication | Number of use reports | Number of species for the indication | ICF |
|------|------------|-----------------------|-------------------------------------|-----|
| 1    | Bad spirit  | 2                     | 1                                  | 1   |
| 2    | Tuberculosis| 2                     | 1                                  | 1   |
| 3    | Impotency   | 2                     | 1                                  | 1   |
| 4    | Chills (wurch)| 2                     | 1                                  | 1   |
| 5    | Measles     | 2                     | 1                                  | 1   |
| 6    | Postpartum hemorrhage | 2                     | 1                                  | 1   |
| 7    | Evil eye    | 7                     | 2                                  | 0.8 |
| 8    | Tumor       | 6                     | 2                                  | 0.8 |
| 9    | Wound       | 6                     | 3                                  | 0.6 |
| 10   | Asthma      | 5                     | 3                                  | 0.5 |
| 11   | Rabies      | 3                     | 2                                  | 0.5 |

study revealed that the use of a higher number of medicinal animal species compared to studies conducted in Arba Minch Zuria District [15] and Kafa-Humar [3] that reported the use of 19 and 16 animal species respectively. In this study majority of the medicinal animals (72%) were wild animals. This finding is concordant with the study conducted in Semi-arid Regions of Northern Brazil which reported wild animals as the major (77.7%) source of animal-based complementary medicines [7]. Similarly, the findings of the study conducted by Kebebew and his co-workers in Arba Minch District also reported that more than half (65%) of the medicinal animals were obtained from wild sources [15]. Besides, the study conducted in Kafa-Humera District of Northern Ethiopia also reported that more than half of the medicinal animals were obtained from wild sources [3]. This finding indicated that traditional medicinal practitioners and indigenous people are mostly dependent on the wild sources which might be related to the preference of the community for wild animals.

In this study, Mammals were the most commonly (64%) used class of animals followed by birds (16%) and reptiles (8%). This finding is in line with the review conducted in the Mexican traditional system that
reported mammals as the most commonly used medicinal class of animal species followed by birds and reptiles [16]. The study conducted in the semi-arid region of Northern Brazil also reported mammals as the most commonly used class of medicinal species [13]. Similarly, the study conducted among the indigenous people of Metema Woreda Northwestern Ethiopia also reported mammals as the most commonly used animal species followed by birds and reptiles [17]. The present study is also concordant with the study conducted at Arba Minch Zuria District that reported mammals (60%) as the most commonly used class of animals compared to other medicinal species used by the study informants [15].

The present study indicated that different parts/products of medicinal animals are used for their healing values. Based on the finding from this study meat or fatty meat was the most commonly (27.5%) used animals’ part for its medicinal value followed by liver, skin, and excreta (urine and feces) (7.5% each). Similarly, other studies also studied the meat/flesh of different animals as most commonly used for its medicinal value for the management of different ailments [15, 17, 18, 19]. In this study, the informants mentioned using different parts/products of the medicinal animals in different forms. Direct use of the medicinal animal is the most common (36.3%) mode for the use of the medicinal animal followed by mixing with other ingredients (10%) and preparation of soup/stew (8.8%). This study is concordant with the study conducted in Arba Minch Zuria District that reported direct use, preparation of soup, and mixing with other ingredients as the most frequently used modes of preparation of medicinal animals [15]. This study also reported the oral route as the most commonly (50.0%) used route for administration of medicinal preparations followed by the dermal route (30.8%). Similarly, other studies also reported the oral route as the major route for administration of the medicinal preparations [3, 20, 21]. However, contrary to our study finding the study conducted in Arba Minch Zuria District reported the dermal route as the major route compared to the oral route of administration [15].

The relative importance of a species cited by the informants was determined using use-value. The present study reported Hyena (Crocuta Crocuta) as the commonly (%UV = 36%) cited medicinal animal followed by a snake (Snake Spp) (%UV = 18%). The higher use-value of some of the species might be related to the preparation of different remedies from the different parts of a single animal species to treat different ailments [22]. However, the study conducted in the semi-arid region of Northern Brazil reported Bee (Apis mellifera) as the most commonly cited (%UV = 56%) species [13].

The fidelity level of medicinal animal species was determined for the most commonly reported disease by the informants. In the present study, the fidelity level values of medicinal animal species range from 18.2% to 100%. Honey bee for chills, stingless bee for asthma, whisper for nightmare, and Tiger for rabies virus has a fidelity level of 100% each. This high fidelity level is due to the use of the species/product only for the claimed indication (Table 8). The least fidelity level is observed hyena for the treatment/prevention of bad spirit. However, a large proportion of informants claimed the use of hyena for the treatment/prevention of more indications than other species.

The level of agreement between the informants of the study was determined using informant consensus factor. This study revealed that informants have a high level of agreement (ICF = 1) in the treatment of bad spirit, tuberculosis, impotency, chills (Wurch), measles, and postpartum hemorrhage. However, the informants have a high level of heterogeneity (ICF < 0.5) in the treatment of rabies virus and asthma (Table 9) due to the disagreement among the informants on the use of medicinal animal species. From the present study, we found that only one species is used for the management of bad spirit, tuberculosis, impotency, chills, measles, and postpartum hemorrhage.

In this study, from a total of 33 informants, only 7 (21.2%) know about zoonotic disease. This finding is in line with the study conducted in Amaro Woreda, Southern Ethiopia [19]. However, a high proportion of informants (78.8%) didn't know about zoonotic disease. The reason for this might be because of inability of the majority (57.6%) of the informants to read and write. Two out of seven informants use herbal preparations for the prevention of zoonotic disease transmission from medicinal animals.

The informants of the study mentioned that most of the medicinal animal species are being lost due to deforestation and over-exploitation. The loss of medicinal animals might be associated with slaughtering the animal species to collect the meat, organ, blood, and other parts which were commonly reported to prepare most of the medicinal remedies. The present study revealed that the attempt of conserving animals from extinction in the study area was rare. Among the respondents, a few (6%) have responded that they are trying to maintain medicinal animals by planting trees.

5. Conclusion and recommendations

Developing countries commonly used traditional medicines as one of the alternative medicinal practices. In Motta city administration and Hulet Eju Enessie district, Traditional medicinal practitioners and indigenous people practiced traditional medicine using animal based remedies. In this study 25 animal species that belong to mammals, birds, reptiles, amphibia, and insects were used for the management of 38 types of ailments. Mammals were the most frequently used. Although the traditional medicinal practitioners and indigenous people are skilled with the preparation and administration of animal based remedies, less effort has been made to conserve the medicinal animals. Therefore, the local community should be alerted on the significance of biodiversity and sustainable use of species identified as sources of ethnozoological medicine in the study area. Besides, Multi-disciplinary scholarly experimental studies need to be conducted on the medical uses of animals and their products to identify potential lead compounds to modern drugs.

Declarations

Author contribution statement

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Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

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