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Conservation Status of Animal Species Used by Indigenous Traditional Medicine Practitioners in Ogbomoso, Oyo State

J. Ebele Ajagun[1*] and E. Caesar Anyaku[2]

[1]Medicinal Plant Unit, Bioresources Development Centre, National Biotechnology Development Agency, Ogbomoso, Oyo State, Nigeria.
[2]Veterinary Unit, Bioresources Development Centre, National Biotechnology Development Agency Ogbomoso, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Author JEA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Author ECA took part in the survey, managed the literature searches and contributed to the first draft of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: To document the indigenous knowledge of fauna species used in traditional medicine practices and to establish their conservational status.
Study Design: A questionnaire guided survey of the traditional uses of fauna species by the indigenous people of Ogbomoso, Oyo State.
Place and Duration of Study: Bioresources Development Centre, Ogbomoso, Oyo State, Nigeria between March and December, 2016.
Methodology: A total of 43 participants were interviewed during the survey and constituted 4 hunters, 19 traditional medicine practitioner (TMP) and 20 trado-herbal traders (THT) as the study population. Animal species utilized for different traditional preparations, factors affecting the

**Corresponding author: E-mail: ajagunebelejoan@gmail.com;*

availability of these species all year round and respondents' knowledge on conservational issues were recorded.

Results: 55 animal species (both wild and domesticated) were identified as being used for various traditional purposes. Twenty-two are listed as threatened in the Control of International Trade in Endangered Species listings. It also revealed 15 endangered 2 critically endangered, 2 vulnerable and 6 near threatened based on the International Union for the Conservation of nature red list. Hence, 18 fauna species are either threatened with extinction now or would be in the near future. The survey also revealed the lack of knowledge of the respondents on the ethics and or goals of conservation. However, it confirmed the declining availability of these vital raw materials for traditional medicine practices.

Conclusion: The wide acceptance of fauna-based traditional preparations for the health care needs of the vast population has resulted in the depletion of available animal species.

Keywords: Conservation status; traditional medicine practices; Ogbomoso; fauna based preparations.

1. INTRODUCTION

Traditional medicine preparations have been an indispensible source of both preventive and curative medicine to a vast proportion of the worlds' population as an estimated 80% still relies on traditional medicine for their primary health care needs till date [1,2]. Traditional medicine practices are widely spread in Africa and have been practiced since time immemorial [3]. Traditional medicine has been defined as the sum total of all the knowledge, skills, practice-based theories, beliefs and experiences indigenous to various cultures used in either the prevention, diagnosis, improvement, treatment of physical and mental illness as well as the maintenance of health whether explainable or not [4] and involves the use of both medicinal herbs and or animal parts.

Plant and animal species (parts and by-products) have been known to serve as essential ingredients in the preparation of traditional medicines [1,2,3]. Also, animals and their by-product have been known to prevent, cure and manage a number of diseases such as hypertension, diabetes, epilepsy, cancer, convulsion and mental illness etc. [5,6].

Over 1500 animal species have been documented to have some medicinal properties worldwide and have been used in the management of various chronic disease conditions by various ethnic groups and tribes till date [3,7]. They have been known to serve as raw materials in modern pharmaceuticals [8] in addition to their being used as active ingredients in traditional medicine preparations, ritualistic and religious practices [9]. This has resulted in the increase in the trade of animal species as a primary source of income to traders, traditional medicine practitioners, hunters and their dependents [10,11,12,13]. A vast majority of these animal species are sourced from the wild as has been established by research and thus these sources have been said to be declining in quantity and spread [9,14,15,16,17]. The resultant consequence is a continued depletion and the extinction of these resources in the wild.

The wide acceptance of traditional medicine practices in Africa may be attributed to its lower cost, ready availability, familiarity, the high number of traditional medicine practitioners as compared to western/orthodox practitioners as reported by [9,14]. Hence, the demands for raw materials for these preparations are most likely to increase due to population expansion as well as increased acceptance of traditional medicine [9,10]. This proposed increase in demand would put additional strain on already depleted natural reserves of wild fauna for medicinal purposes and considerable strain on the biodiversity of these animal species. This ultimately affects the conservation status of these animal species and the biodiversity of the ecosystem.

Soewu [9] reported the lack availability of substitutes for the highly sourced raw materials hence the need to somehow maintain the available species and take steps/measures to ensure sustainability. Time has come to record knowledge with regards to fauna species used for traditional medicine and non-medicine purposes; determine the conservational status of animal species used in traditional practices; enlighten the indigenes on the need and goals of conservation; enlighten indigenes on the need to avoid indiscriminate killing of animals and also to devise strategies to ensure sustainability of these resources.

2. MATERIALS AND METHODS

Oyo is an inland state in the south-western part of Nigeria with its capital at Ibadan. It is bounded to the west by Ogun State and the Republic of Benin, the north by Kwara State and the east by Osun State.

Ogbomoso is second largest city in Oyo sate; located on Latitude 8° 7^{I} 60^{II} N and Longitude $4°16^{I}0^{II}$ E of the Equator with an elevation of 347 meters above sea level and serves as the gateway to Northern part of Nigeria from the West.

Open-ended questionnaires were administered to all participants. The respondents for the study were traders in herbs and animal species used for traditional medicine practices, hunters as well as traditional medicine practitioners.

Interviews were conducted by the authors to minimize issues of bias with adequate aid from indigenes field assistants. Each traditional medicine practitioner was visited twice while the traders and hunters were visited once each during the course of the survey. A total of 43 persons were interviewed during the survey and constituted 4 hunters, 19 traditional medicine practitioner (TMP) and 20 trado-herbal traders (THT) as the study population.

Animal species utilized for different traditional preparations were recorded. References were made to the International Union of Conservation of Nature (IUCN Red list) and Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES appendices) for the listing on global level to evaluate the current status of these species.

Correlation was then used to establish a relationship between respondents' educational level and awareness and ethic on conservation matters.

3. RESULTS AND DISCUSSION

Fifty-five (55) animal species were identified for use in various traditional preparations (both medical and non-medical) and represented the six classes in the phylum chordate. The degree of frequency of observed species was recorded in the order mammals (50.9%) > avian (23.6%) > reptiles (16.4%) as shown in Table 1. These fauna species were either used alone or in combination with other species and or medicinal plants. The high number of species used as observed by this study goes a long way to prove the wide acceptances of traditional based medications for whatever purpose and was in line with results from similar studies conducted locally, within Africa and globally as seen by the integration of traditional medicine with orthodox medicine [3,7,9,10].

Animal species (both wild and domesticated) have been documented as a major source of revenue to traditional medicine practitioners, trado-herbal traders and their dependants who are said to consume vast quantities of these animals [9,18]. The survey of the traditional medical and non-medical uses of animal species by indigenous people of Ogbomoso revealed that they traded in 55 animal species consisting of both wild and domesticated animal for various traditional uses (Table 2) and similar to studies reported by [8] but higher than that reported in similar studies by [2] and [19].

Table 3 highlights species encountered during the survey that are listed in the IUCN red list and appendix I, II and III of the CITES listing, thereby illustrating the conservation status of the animals species used by the indigenous people of Ogbomoso, Oyo State. Based on the IUCN red list, the survey revealed 15 animal species were endangered, 2 critically endangered, 2 vulnerable, 6 near threatened and 28 least concerned. With reference to the CITES appendix listing, 5 species were listed in appendix I, 13 in appendix II, 4 in appendix III whilst 2 were listed in both appendix I and II. However, with reference to both IUCN red list and CITES listing, 18 species are either threatened with extinction now or would be in the near future [19,20].

The reported continuous use of animal-based traditional medicine has been shown to be unsustainable, hence has been highlighted as a potential threat to biodiversity [6,21] and may ultimately result in the extinction of a vast number of animal species as demonstrated by the results of this survey. The conservation status of the animal species reported were similar to other studies conducted by [9,22] and [23] who also reported a high proportion of endangered mammalian species been used in both medical and non-medical traditional practices. Hence the need to adopt conservation practices to ensure these continuous supplies in line with demand.

Table 1. Number of animal species identified in Oja-Igbo traditional medicine market

Species phylum identified	No. of species observed	Percentage frequency (%)
Arthropods	2	3.6
Amphibians	2	3.6
Molluscs	1	1.8
Reptiles	9	16.4
Avians	13	23.6
Mammals	28	50.9

One cannot help but agree that there is the need to ensure the sustainability in the wild supply of animal species due to the increase in acceptance and use of animal based traditional medicine [9,23]. Although a lot of suggestions have been made as which technique is best for conservation [23], the modern conservation of biodiversity which allows conservation issues to meet with development concerns might just be the best approach [24]. However, Chardonnet et al. [25] suggested the need for a better understanding of the biology and ecology animal species used in traditional medicinal preparations so as to understand the impact/implication of harvesting them from alternative sources.

Majority of the respondents were not aware of the ethic/goal(s) of conservation and the conservational status of the animal species used (Table 4). They also admitted not engaging in any conservation practice. They however admitted the decline in the availability of animal species and the accompanied increase in price. Further analysis of data obtained demonstrated a correlation between the respondents' educational levels and awareness on the ethics behind the need for conservation of animal species used in traditional practices.

Nigeria has been flagged as the primary source of wild animal species to the majority of African countries as reported by [26,27,28], hence any effect on the availability of these species would ultimately have an economic impact on the neighbouring traditional medicine markets and dependants of these practitioners and traders. These lays emphasis on the need for the speedy adoption of conservation techniques aimed at sustaining the declining supply of raw materials for traditional medicinal and non-medical practices.

Table 2. Animal species used in traditional medical and non-medical practices

Scientific name	Common name	Yoruba name
Arthropod spp		
Malacostraca spp	Crap	Alakan/Akan
Apis mallifera	Honey bee	Oyin
Amphibian spp		
Bufo regularis	African common toad	Konko
Rana temporaria	Frog	Opolo
Molluscs spp		
Archachatina marginata	African giant land snail	Igbin
Reptilian spp		
Kinixys spp	Tortoise	Ijapa/Ajapa
Chamaeleo senegalensis	Senegal chameleon	Oga
Varanus niloticus	Nile monitor lizard	Aworiwon
Crocodylus niloticus	Nile crocodile	Oni
Python sebae	African rock python	Ere
Bitis gabonica	Gabon viper	Paramole
Naja spp	Cobra	Oka
Dendroaspis spp	Mamba	Sebe
Agama agama	Red-headed rock agama lizard	Alangba
Avian spp		
Psittacus erithacus	African grey parrot	Eye aiyekoto
Phataginus tricuspis	White-bellied pangolin	Akika
Pternistis bicalcaratus	Double-spurred francolin	Aparo
Pavo cristatus	Indian peafowl	Okin
Lamprotornis chalybaeus	Blue-eared glossy starling	Agbe
Necrosyrtes monachus	Hooded vulture	Igun
Bubo africanus	Spotted eagle owl	Owiwi
Ardeola ibis	Cattle egret	Lekeleke

Scientific name	Common name	Yoruba name
Streptoprelia semitorquata	Red eye dove	Adaba
Corvus edithae	Somali crow	Kanakana
Hirundo rustica	Barn swallow	Alapandede
Centropus senegalensis	Senegal coucal	Elulu
Mimus polyglottos	Mocking bird	Awoko
Mammalian spp		
Hystrix cristata	Crested porcupine	Lili
Oryctolagus cuniculus	Rabbit	Ehoro
Bos Taurus	Cow	Malu
Rattus rattus	Domestic rat	Egbera/eku
Ovis aries	Sheep	Aguntan
Equus ferus caballus	Horse	Esin
Crocuta crocuta	Spotted hyena	Ikooko
Canis lupus familiaris	Domestic dog	Aja
Capra aegagrus hircus	Goat	Ewure
Hybomys trivirgatus	Stripped mouse	Eku onilakan
Thryonomys swinderianus	Greater cane rat	Oya
Cephalophus maxwelli	Maxwell's duiker	Etu
Cricetomys gambianus	Giant rat	Okete
Felis silvestris	Wild cat	Olongbo oko
Felis silvestris catus	Domestic cat	Olongbo ile
Syncerus caffer	African buffalo	Efon
Crocidiora nigeriae	Shrew	Asin
Leptailurus serval	Serval cat	Ekun
Tragelaphus scriptus	Bushbuck	Igala
Gorilla gorilla	Gorilla	Inaki
Mus minutoides	Pigmy mouse	Eliri
Civettictis civetta	African civet cat	Eta
Erythrocebus patas	Patas monkey	Ijimere
Colobus guereza	Colobus monkey	Alakadun
Funisciurus anerythrus	Tree squirrel	Okere
Eidolon helvum	Straw-coloured fruit bat	Adan
Panthera leo	Lion	Kiniun
Pan troglodytes	Chimpanzee	Obo

Table 3. Conservation status of animal species under the IUCN and appendix I, II and III of CITES listing

Common name	Scientific name	IUCN status[a]	CITES listing[b]
Crap	*Malacostraca spp*	VU	-
Honey bee	*Apis mellifera*	DD	-
African common toad	*Bufo regularis*	LC	I
Frog	*Rana temporaria*	NT	-
African giant land snail	*Archachatina marginata*	EN	-
Tortoise	*Kinixys spp*	EN	-
Senegal chameleon	*Chamaeleo senegalensis*	LC	II
Nile monitor lizard	*Varanus niloticus*	EN	II
Nile crocodile	*Crocodylus niloticus*	LC	I & II
African rock python	*Python sebae*	EN	II
Gabon viper	*Bitis gabonica*	LC	-
Cobra	*Naja spp*	LC	II
Mamba	*Dendroaspis spp*	LC	-
Red-headed rock agama lizard	*Agama agama*	LC	-
African grey parrot	*Psittacus erithacus*	EN	I
White-bellied pangolin	*Phataginus tricuspis*	VU	II
Double-spurred francolin	*Pternistis bicalcaratus*	LC	-
Indian peafowl	*Pavo cristatus*	LC	III
Blue-eared glossy starling	*Lamprotornis chalybaeus*	LC	-

Common name	Scientific name	IUCN status[a]	CITES listing[b]
Hooded vulture	*Necrosyrtes monachus*	EN	II
Spotted eagle owl	*Bubo africanus*	LC	II
Cattle egret	*Ardeola ibis*	EN	III
Red eye dove	*Streptoprelia semitorquata*	LC	-
Somali crow	*Corvus edithae*	LC	-
Barn swallow	*Hirundo rustica*	LC	-
Senegal coucal	*Centropus senegalensis*	LC	-
Mocking bird	*Mimus polyglottos*	LC	-
Crested porcupine	*Hystrix cristata*	NT	-
Rabbit	*Oryctolagus cuniculus*	NT	III
Cow	*Bos taurus*	EN	-
Domestic rat	*Rattus rattus*	LC	-
Sheep	*Ovis aries*	EN	II
Horse	*Eqqus ferus caballus*	DD	-
Spotted hyena	*Crocuta crocuta*	LC	-
Domestic dog	*Canis lupus familiaris*	EN	II
Goat	*Capra aegagrus hircus*	EN	III
Stripped mouse	*Hybomys trivirgatus*	LC	-
Greater cane rat	*Thryonomys swinderianus*	LC	-
Maxwell's duiker	*Cephalophus maxwelli*	EN	-
Giant rat	*Cricetomys gambianus*	LC	-
Wild cat	*Felis silvestris*	LC	II
Domestic cat	*Felis silvestris catus*	LC	-
African buffalo	*Syncerus caffer*	NT	-
Shrew	*Crocidiora nigeriae*	LC	-
Serval cat	*Leptailurus serval*	LC	II
Bushbuck	*Tragelaphus scriptus*	EN	-
Gorilla	*Gorilla gorilla*	CR	I
Pigmy mouse	*Mus minutoides*	LC	-
African civet cat	*Civettictis civetta*	EN	III
Patas monkey	*Erythrocebus patas*	NT	II
Colobus monkey	*Colobus guereza*	LC	I & II
Tree squirrel	*Funisciurus anerythrus*	LC	-
Straw-coloured fruit bat	*Eidolon helvum*	NT	-
Lion	*Panthera leo*	EN	I
Chimpanzee	*Pan troglodytes*	EN	I

**EN Endangered, *CR Critically endangered, *VU Vulnerable, *NT Near threatened, * LC Least concern, *DD Data deficient [a] http://www.iucnredlist.org/ ; [b] https://cites.org>eng>app*

Table 4. Correlation between educational level of TMP, ethics and awareness on conservation

Correlation				
		1	**2**	**3**
Educational qualification	Pearson Correlation	1	.663**	.284
	Sig. (2-tailed)	-	.002	.238
	N	19	19	19
Awareness on ethic behind animal use	Pearson Correlation	.663**	1	.122
	Sig. (2-tailed)	.002	-	.620
	N	19	19	19
Awareness on need for conservation of animals	Pearson Correlation	.284	.122	1
	Sig. (2-tailed)	.238	.620	-
	N	19	19	19

***. Correlation is significant at the 0.01 level (2-tailed). 1=educational qualification, 2= awareness on ethic behind animal use, 3=awareness on need for conservation of animals*

4. CONCLUSION

Knowledge, information and evidence authenticating the use of fauna-based medicines are lacking. The acceptance of traditional medicine preparations for the health care needs of the vast population has lead to the call for the documentation of folkloric information so as to

prevent knowledge loss due to industrialization and urbanization; and hopefully the integration of traditional medicinal practices in the existing health care system in Nigeria.

Documented depletion of animal species (as raw materials) for traditional medical has made it necessary and important that issues relating to conservation be made available to traditional medicine practitioners, trado-herbal traders and hunters. It has therefore become necessary that all are involved in the fight towards preventing the further extinction of endangered species by the combined efforts of both the agencies/organisation involved in ensuring the conservation of these animals and the end users of these animals.

CONSENT

Informed consent was obtained from the respondents prior to data collection.

ETHICAL APPROVAL

Ethical approval is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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