Fauna of the African continent: an under-utilized treasure and a neglected pharmaceutical asset

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ABSTRACT

Background: Phytotherapy and zootherapy are both employed by all tribes and cultures of the world in traditional medicine. In most cases, a combination of plants or plant products with animal parts or products are included in the recipes for the management, treatment or cure of illnesses and diseases, while in other cases only animal parts and products are used as medications.

Objective: The various plants and plant products used in different cultures have been documented and are well reported. However, the inventory and recipes involving the use of animal parts and products in traditional medicine are scanty particularly in the African traditional medicine and mainly Nigeria.

Methods: The information on animal parts and products used as medication were obtained from reference, established literature of the various regions and cultures, as well as information on animals and animal products in southwestern Nigeria as they are used in the community.

Results: Animal parts and products from the Asian cultures are included in medications sold in the pharmacies. Some of the animal part products used as medication and part of medications in various regions of the world have been reported. In addition, a comparison of the animal part products from Latin America and various regions in Asia, Indo-Asia have been made with those from the African continent, particularly Nigeria. Furthermore, a few alternative species of Animal parts and products abundant in Nigeria that can serve the same purpose as those identified and reported in other parts of the world have been identified.

Conclusion: It is therefore necessary to create awareness of animal parts and products in the Nigerian traditional medicine observed to be effective in the treatment, management of diseases and the need to inventory these animals before the knowledge of their values are lost, as well as the need to carry out their scientific evaluation to establish their efficacy and possible lead to novel drugs.

Keywords: Fauna, African continent, animal parts, pharmaceutical asset.

La faune du continent africain, un trésor sous-utilisé et un atout pharmaceutique négligé

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RÉSUMÉ

Contexte : La phytothérapie et la zoothérapie sont toutes deux utilisées par toutes les tribus et cultures du monde en médecine traditionnelle. Dans la plupart des cas, une combinaison de plantes ou de produits d'origine végétale avec des parties ou des produits d'origine animale est incluse dans les recettes pour la gestion, le traitement ou la guérison des maladies, tandis que dans d'autres cas, seuls les parties et les produits d'origine animale sont utilisés comme médicaments.

Objectif : Les diverses plantes et produits d'origine végétale utilisés dans les différentes cultures ont été documentés et sont bien connus. Cependant, l'inventaire et les recettes impliquant l'utilisation de parties et de produits d'origine animale dans la médecine traditionnelle sont peu nombreux, en particulier dans la médecine traditionnelle africaine et principalement au Nigeria.

Méthodes : Les informations sur les parties et les produits d'origine animale utilisés comme médicaments ont été obtenues à partir de la littérature de référence établie des différentes régions et cultures, ainsi que des informations sur les animaux et les produits d'origine animale dans le sud-ouest du Nigeria, tels qu'ils sont utilisés dans la communauté.

Résultats : Des produits et des parties d'origine animale des cultures asiatiques sont inclus dans les médicaments vendus en pharmacie. Certains des produits d'origine animale utilisés comme médicaments et faisant partie de médicaments dans diverses régions du monde ont été signalés. En outre, une comparaison des produits d'origine animale d'Amérique latine et de diverses régions d'Asie, d'Indo-Asie a été faite avec ceux du continent africain, en particulier le Nigeria. En outre, quelques espèces alternatives de parties et de produits d'origine animale abondants au Nigeria qui peuvent servir le même objectif que ceux identifiés et signalés dans d'autres parties du monde ont été identifiées.

Conclusion : Il est donc nécessaire de faire connaître les parties et produits d'origine animale dans la médecine traditionnelle nigériane considérés comme étant efficaces dans le traitement, la gestion des maladies et la nécessité d'inventorier ces animaux avant que la connaissance de leurs valeurs ne soit perdue, ainsi que la nécessité de procéder à leur évaluation scientifique afin d'établir leur efficacité et éventuellement déboucher sur de nouveaux médicaments.

Mots clés : Faune, continent africain, parties animales, actif pharmaceutique.

Introduction

The members of the fauna and flora have and are still being used as food and medicine by humans in various cultures. A combination of fauna and flora has not only been a source of nutrition, nutraceutical, it has also served as traditional medication for the management of illnesses and diseases.

The arboreal, terrestrial, and marine fauna and flora are adopted in traditional recipes of different cultures in all the continents of the world.

In a few cases, the fauna and flora recipes of some cultures are well documented and are used alone as complementary or alternative medication with some of the important constituents reported. In every culture, Insects, reptiles, mollusks, mammals, and birds are used as recipes in traditional medications.[1,2]

The scientific investigation of the flora all over the world are well documented, though the number of species studied compared to the number in existence is still minimal. A comparison of the studied, investigated and reported number of species of the fauna are very negligible.

Some species of the fauna in different traditional medicine have been found useful in the management and treatment of diseases[3,4] as well as considered as potential novel drugs.[5]

This article therefore aims at giving information and awareness that the fauna of the African continent is a treasure that is underutilized.

Latin America

In Latin American countries such as Brazil, Bolivia and Mexico, it has been reported that 584 animals are included in their traditional medicinal recipes. In Brazil alone, 354 animals are used as medicine.[6]

Mollusks, insects, and reptiles are mainly used for instance, snails and clams are used for the treatment of ulcer, boils, and asthma, while periwinkles serve as treatment for chesty cough and shortness of breath.[6]

Furthermore, honey from Apis species is an essential relief component for cough, ulcer, flu, burns, wounds and asthma. That the Boa constrictor fat serves as a component recipe for rheumatism, thrombosis, swelling, inflammation, and lung diseases has been reported.[7]

Asia

The Asian countries have reported the use of several animal parts, products and secretions in their traditional medicine recipes. There are, however, some similarities in the use of specific animals in medications in the different Asian communities.

In the Philippines, both wild and domestic animals are used in mitigating, managing and treating diseases.8 The different parts of reptiles such as the cobra and python are mostly used, particularly the bile, which serves as a main source of medicine in the region.

The flesh and fats of animals are also used as treatment for skin diseases and rheumatic pains in the Philippines while the decoction of the internal organs as well as the shell of turtle are used in malaria, diabetes, and rheumatism medications.[9]

The internal organs, fats, liver and bile of the reticulated python as well as the flesh, skin and bones of cobra when chewed are used in this region for headache, fever, rheumatism, raised blood pressure and diabetes,[7,10,11.] while the decoction of the grilled and fried lizard is a remedy for fatigue and headache in the Philippines.

Indian Subcontinent

In the Indian regions, the use of animals as therapy are well documented in Caraka samhita and Ayurveda. About 15% -20% of Ayurveda medicine is made of animal parts, and products.[12,13] The urine of cow, dog and goat are used as treatment for poison, fever, earache and tuberculosis, while the fat of pig are used as cream for relieving muscular pains.

The ash of turtle is used as treatment for respiratory ailments, cough, asthma and tuberculosis[12] and honey as cure for eye diseases.

A type of snail, *Cryptozona bistrialia*, is boiled, eaten to increase sexual power while *Pila* species, the freshwater snail is taken raw to improve and give good eye sight.[2] Some studies have identified the number of animals in the recipes of the different Indian regions. Furthermore, the use of an animal in treating a particular ailment in one region is used for another purpose in other parts. For example, the fat of Sus scrofa is used as relief for muscular pain in the Ao area of Nagaland and yet as treatment for hemorrhoids in the Tamilnadu region.[14]

In addition, leech therapy is used in the Karbi Anglong region for the treatment of circulatory disorders, elephantiasis, arthritis, blood clotting and varicose veins.[5]

Table 1: Indian Regions where at least ten animal parts and secretions are used in traditional medicinal recipes.

Region	Number of Animal Parts	Reference
Mogya, Meena, Bawaria	15	4
Karbi Anglong District	48	5
Ao tribe of Nagaland	25	15
Naga tribe of Nagaland	26	16
Irular, kurimba of Taminadu	26	17
Kanikar, Paliyar of Taminadu	11	18
Gujrat	34	19
Chhattisgarh	10	20
Bhil of Rajasthan	17	21
Chakhesang of Nagaland	23	22

AFRICA

The fauna and flora of the African continent is diverse and rich in pharmaceutical and medicinal values. Though different species from the flora have been investigated, classified and described from botanical and palaeontologic perspective, yet not much structured chemical assay and bioactive investigation for their pharmaceutical and medicinal potentials have been reported.

The fauna is not as well researched. Most of the continent has folkloric - oral transmission of utilization of flora for medicinal use in the past century except in the Egyptian and Nubian region. However, a direct comparison of written records of the Egyptian, Nubian, Indian, Chinese religion and medicinal practice is not readily available.

In the practice of indigenous medicine in African countries, secretions or parts of animals are incorporated into the recipes used in the management of diseases. In Ethiopia, the milk and whole Camelus dromedarius is used as treatment for headache and migraine while the bile of Paraechinus aethiopicus is used for treating diarrhoea and abdominal cramp while honey is used in treating allergies, burns and common cold.[23]

In Sudan, twenty-three animals and their products have been reported to be used as sources of remedies.[24] While honey serves as treatment for gastric ulcer and wound healing, a topical application of the fat of lion and hyena is known to have been used in the treatment of abdominal pains.[24]

The combination of various plant parts: roots, latex, leaves as well as animal secretions such as the giant African snail haemolymph, venoms of wasps, beeswax, snake venoms and animal parts - scales, testes and horns have not been extensively subjected to scientific evaluation.

In South West Nigeria, animals such as birds, reptiles, fish, rodents, mollusk and insects are commonly used as part of traditional medications.

***Archachatina marginata* - The Giant African Snail**

The various parts of the African giant snail are used as part of recipes and concoction in the practice of indigenous (traditional) medicine. The haemolymph of Archachatina marginata plays a role in the traditional medicine management of Diabetes mellitus,[25,26] while the meat is believed to control increased blood pressure. This has been investigated and reported.[27] The GC-MS of the haemolymph has identified capric acid,

pentadeconoic acid, 9-octadecanoic acid, n-hexadecanoic acid methyl esters.[26] Furthermore, the ability of the haemolymph in weight loss and lowering of triglyceride in animals have been reported.[26,28] These giant African snails are abundant in Nigeria both as reared variety and in the wild, hence they are accessible and easy to obtain. Further investigations of this animal species could lead to dietary supplements that can assist in weight loss, which is important for the control of glycemic index and lowering of blood pressure. In addition, this could provide readily available alternatives to imported, western medications. The medicinal and pharmacological evaluation of the potentials of this species requires more detailed analysis.

Honey

The secretion of Bees (Apis mellifera), honey and beeswax are vital composition as sweetener, medication, as well as traditional beauty product. Furthermore, in southwest Nigeria, honey is used for spiritual rites and traditional ceremonies such as naming and traditional wedding ceremonies. As a medication, traditionally, honey is used as treatment for wounds as well as enhancing healing of non-vascular diabetic ulcers. This has been investigated and reported by several studies,[29,30] and as an emetic. The awareness that honey keeps and does not deteriorate has resulted in its ceremonial and mythical association in tradition.

African Termites and Queen Termites

Traditionally, *Macrotermes nigeriensis* and other *Macrotermes* species are roasted and eaten in southwest Nigeria and other African countries. They are good sources of vitamins mainly A and C, proteins, and fat.[31-34] A formulation with these will make available cheap and accessible vitamins. This is yet another unexplored medicinal, and or nutraceutical potential that may be of importance to the African continent particularly, Nigeria.

Clarias gariepinus - The African Catfish

The African catfish, which are abundant in freshwater rivers and reared are rich in oils containing polyunsaturated fatty acids.[35-37] The omega 3 and 6 fatty acids in the African catfish makes them a potential alternative to cod liver oil and could be reared intensively to provide alternative to imports.

Boa constrictor

The fat of the Boa constrictor is believed in traditional medicine to have healing, soothing powers for bruises, accident wounds and injuries as well as removing of bumps and abnormal growths. The fat enhances transcutaneous absorption.[38-39]

Similarities in the medicinal uses of fauna in Nigeria and the rest of the world.

There are close similarities in the use of animal parts and products in the various Nigeria tribes, and the Asian tribes. First, both regions are rich in fauna diversity. However, the inventory and report of the use of fauna in the Nigerian tribes are extremely scanty.

The use of fat from reptiles for the treatment of rheumatism, arthritis and other circulatory ailments are very common to African and Asian-Indo-Chinese communities, and the use of honey in wound healing is the same in Latin America, Asian regions, and the African continent.[6-7;11-12]

In the African continent, fat from reptiles, such as the boa constrictor, and the lion is used for the same purpose of pain relief in Sudan[24] and Nigeria.

Challenges of using animals as medication

The use of animals, their products and secretions can pose a challenge which could lead to extinction of rare animal species, depletion of animals, as well as poaching. However, some of the animals highlighted, reported to possess medicinal values and which could be included in medications and supplements such as the African catfish, snails, pigs, some insects such as the African honey bees and queen termites can actually be reared for such purpose.

Furthermore, several pharmaceutical products which contain animal products and secretions are sold in pharmacies as components of orthodox medications. Pancrelipase from the pancreas of porcine is currently used as a digestive supplement while Dalteparin from the pig mucosa is used as an anticoagulant.[40-41]

Furthermore, Gelatin from the animal skin and bones are used as capsules for drugs, while both lovaza and vascepa from fish oil lower triglycerides. Insulin from animals - Porcine and Bovine for the management of Diabetes mellitus is already in use,[42] and could be developed locally rather than being imported.

CONCLUSION

The biodiversity in the fauna of the African fauna is rich in resources that can be developed for safe, cheap and accessible products that can serve as supplement and

medications.

In addition, the need to inventory species of the fauna that are used as medications in African traditional medicine in the different tribes and culture is important for record purposes before the information are completely lost. All these animals and their products used in traditional medicine have shown that immense reserve of plants and animals might require research investigations that will make available medications that are affordable as well as can be adopted as an alternative to synthetic medications. Furthermore, research into them for future purpose as sources of novel drugs will be necessary.

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