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Ethnopharmacological Study of Medicinal Plants From the Province of Cuanza Norte (Angola)

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ABSTRACT

Studies on African medicinal plants have been limited to some geographically areas, and even though more than 5400 medicinal plants are recognized and documented, other valuable medicinal plant species have not been studied. Ethnopharmacological studies are important for documenting traditional knowledge associated with the medical use of biodiversity. This study aims to document the use of medicinal plants from the Province of Cuanza Norte (Angola). The field work was conducted from December 2018 to January 2019 and the ethnobotanical data were collected using semi-structured interviews. Informants were selected in accordance with their residence and community recognition as healers. Recorded plants are listed along with their popular name, traditional use, part used, and method of preparation. A total of 131 species of medicinal plants were cited. Mukumbi (*Lannea welwitschii*), Santa Maria (*Chenopodium ambrosioides*) and Ditumbata (*Boerhavia diffusa*) were the most cited species. Out of the total plant parts, leaves were the most frequently material used. Regarding the mode of preparation for the medicinal materials, the major form of preparation is maceration, followed by infusion and decoction. The main categories of use were infectious and parasitic diseases (e.g., Malaria); undefined pains and illness; diseases of the digestive system; and endocrine, nutritional, and metabolic diseases (e.g., Diabetes). This study revealed the importance of preserving the ethnobotanical knowledge in order to protect the biodiversity and to discover new therapeutic molecules. A comparison of the results with other studies showed that some of the traditional indications are supported by data from scientific literature.

Keywords: Angola; Cuanza Norte; ethnopharmacology; medicinal plants.

ESTUDO ETNOFARMACOLÓGICO DE PLANTAS MEDICINAIS DA PROVÍNCIA DE CUANZA NORTE (ANGOLA)

RESUMO

Os estudos de plantas medicinais na África encontram-se limitados a determinadas áreas geográficas, e, apesar de haver mais de 5.400 plantas medicinais documentadas no país, outras com importante valor medicinal continuam aguardando para serem estudadas. Os estudos etnofarmacológicos documentam o conhecimento tradicional associado ao uso medicinal da biodiversidade. Este estudo tem como objetivo documentar o uso de plantas medicinais pela população da Província de Cuanza Norte (Angola). O trabalho de campo decorreu entre dezembro de 2018 e janeiro de 2019, e os dados etnobotânicos foram recolhidos por intermédio de entrevistas semiestruturadas. A seleção dos informantes teve como critérios a residência e o reconhecimento pela comunidade como curandeiros. Os resultados foram apresentados por meio do nome popular da planta, uso tradicional, parte da planta utilizada e método de preparação. Um total de 131 plantas medicinais foi relatado. As plantas Mukumbi (*Lannea welwitschii*), Santa-maria (*Chenopodium ambrosioides*) e Ditumbata (*Boerhavia diffusa*) foram as mais citadas. De todas as partes das plantas relacionadas as folhas foram o material mais utilizado. Quanto ao modo de preparação, a maceração foi o mais usado, seguido da infusão e decocção. As principais categorias de uso das plantas foram: doenças infecciosas e parasitárias (exemplo: Malária); doenças do sistema digestivo; doenças e dores indefinidas; doenças metabólicas, nutricionais e endócrinas (exemplo: Diabetes). Este estudo revelou a importância da preservação do conhecimento etnobotânico para a proteção da biodiversidade e a descoberta de novas moléculas terapêuticas. Comparando os resultados com estudos existentes, observou-se que algumas das indicações de uso tradicionais são suportadas por dados científicos.

Palavras-chave: Angola; Cuanza Norte; etnofarmacologia; plantas medicinais.

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INTRODUCTION

The World Health Organization (WHO) Traditional Medicine Strategy 2014-2023 stated that traditional treatments, traditional practitioners, and herbal medicines are the main source of health care, if not the only source, for many millions of people¹. Traditional medicine studies include ethnomedicine, which involves the practices most used by people living in rural areas and indigenous communities². Ethnopharmacology combines information acquired from people that use medicinal plants (traditional communities and experts) with chemical and pharmacological studies, allowing the formulation of hypothesis about the pharmacological activities and compounds responsible for the reported therapeutic effects³.

Natural products, including plants, continue to play an important role in drug discovery. Thus, biodiversity represents an unlimited source for novel chemical entities with potential as drug leads and is required to fulfill various human daily livelihood needs⁴. Therefore, there is an increase in current research in the identification of active ingredients in medicinal plants, their role in the treatment of diseases, drug development, and herbal preparations⁵.

In Africa, modern health care and medicine is often available only to a limited number of people because, either because the facilities are too expensive or because there are too few facilities available for too many people⁶. For example, the ratio of traditional healers to population is 1:500 whereas the ratio of medical doctors to population is 1:40 000⁷. Therefore, it is estimated that 70-80% of the population in Africa are treated by traditional healers and herbal practitioners⁸.

The combination of botanical and cultural diversity in Africa, together with local endemism, results in a complex geographical mosaic of indigenous plant use that remains only partially explored from a scientific and commercial perspective⁹. Besides the gradual loss of ethnobotanical knowledge due to lack of documentation, most authors have highlighted the overharvesting of medicinal material from their natural habitat as one of the major threats to the preservation of traditional medicine. In order to conserve wild plant species (many of them medicinal plants), there is a need for reliable data on their distribution and level of use. Over the last years, the study of Angola's medicinal flora has been the subject of some research, namely by Göhre et al. (2016) and Bruschi et al. (2017)¹⁰⁻¹¹. However, studies on African medicinal plants have in nearly all cases been limited to geographically limited areas¹², and it is known that many valuable medicinal plant species have not yet been studied or fully characterized.

Angola's health care system is poor, compared to other sub-Saharan countries¹³. The lack of health infrastructure, especially in rural areas, is a serious problem resulting in the importance of traditional healers and herbal medicines. Angola hosts high levels in terms of the species richness and endemism, but threats to this rich flora and their habitats are emerging. For all the reasons mentioned



above, it is imperative to conserve and study its biodiversity. Therefore, ethnobotanical studies represent an attractive approach for applying indigenous knowledge of plant use to modern societies, with the final aim of developing new drugs. Angola is the second richest country with respect to endemic plants in continental Africa¹⁴. Therefore, the rich flora of sub-Saharan Africa suggests enormous potential for the discovery of new secondary plant metabolites with therapeutic value¹⁵. There are only a few studies documenting plant usage in Angola, which are either carried out in the south of the country, showing completely different vegetation units¹⁶ or putting the accent on savannah plants¹⁰. So, this study aims to systemize the knowledge regarding medicinal plants used by the inhabitants from N'dalatando (Cazengo), in the Province of Cuanza Norte (Angola), recognized for its cultural and biological diversity, and highlight the relevance of the ethnobotanical findings for a more rational use of the plants or for the implementation of phytotherapy programs.

METHODS

Study area and demographic background

The present study was carried out in the capital N'dalatando (Cazengo), Province of Cuanza Norte (Angola), which belongs to the five Provinces with the lowest population densities in Angola, with a population of about 383100 inhabitants¹⁷.

Sampling of informants

The field work was conducted during a period of two months (from December 2018 to January 2019) and the ethnobotanical data were collected using semi-structured interviews. Informants were selected through the "snowball" technique¹⁸, and a total of 12 traditional informants (6 men and 6 women), agreed to be part of the study and were interviewed independently to avoid bias. The age-group of the informants was between 39 to 69 years old. Informants have lived in N'dalatando since their childhood and were recognized by other members of the community as having traditional botanical experience as healers.

Ethnomedicinal data collection

The survey was conducted through semi-structured, open-ended interviews, in order to preserve the spontaneity of the information. Interviews were held based on a checklist of questions designed to collect data on (i) local names of the plants, (ii) ailments treated by the plants, (iii) used plant part(s), and (iv) preparation methods. All species cited for therapeutic purposes were considered in the study. During guided field walk, photographic records were also taken to capture the field sites, plants, and other useful memories. Informants were also informed that the objectives of the research were not for commercial purposes but for academic purposes and all interviews were performed after obtaining voluntary consent from each informant.

Data analysis



The citations for therapeutic purposes were classified in different categories based on the International Classification of Diseases by WHO¹⁹: infectious and parasitic diseases; neoplasms; diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism; endocrine, nutritional and metabolic diseases; mental and behavioural disorders; diseases of the nervous system; diseases of eye and adnexa; diseases of the ear and mastoid process; diseases of the circulatory system; diseases of the respiratory system; diseases of the digestive system; diseases of the skin and subcutaneous tissue; diseases of the musculoskeletal system and connective tissue; diseases of the genitourinary system; pregnancy, childbirth and puerperium; certain conditions originating in the perinatal period; symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified; injury, poisoning and certain other consequences of external causes.

RESULTS AND DISCUSSION

Plant parts used and preparation methods

Medicinal plants have been used widely for thousands of years to treat various disorders in traditional herbal medicine systems all over the world. Angola is regarded as a country with a rich biodiversity covering a high amount of vegetation zones and habitats²⁰. Therefore, biological resources, which include medicinal plants, can act as a safety net in poor people's livelihoods, providing food, medicine, and other resources¹⁶.

Primary ethnobotanical information for each species like local name, plant part used, popular use, and method of preparation were collected from the informants and summarized in Table 1. A total of 131 plants were cited for the treatment of various types of ailments. These findings confirmed the existence of a great diversity of plants at N'dalatando, in the Province of Cuanza Norte, used for medicinal purpose and preserved in people's culture. In this study, Mukumbi (*Lannea welwitschii* (Hiern) Engl.), Santa-maria (*Chenopodium ambrosioides* L.) and Ditumbata (*Boerhavia diffusa* L.) were the most cited species.

The present study reveals eight plant parts selected as medicinal materials. Out of the total plant parts, leaves were the most frequently material used (44.4 %), followed by underground parts (roots and bulbs with 23.9 %), stems (10.3 %), seeds and fruits (8.5 %), flowers (2.6 %), bark and sap (0.9 %). It is important to notice that, in some species, more than one part can be used. These results are in accordance with studies conducted in other parts of the world²¹⁻²³, which reported the predominant use of plant leaves. Leaves are the main photosynthetic organs and, therefore, photosynthesize exudates containing bioactive compounds with potential medicinal value. Leaves are also easy to collect and prepare²⁴. Moreover, collecting leaves for medicinal purposes is usually not a threat to the survival of plants as compared to the use of other parts like roots, and stem barks. By contrast, the study of Urso et al., (2016) showed that underground organs were cited as the main used parts in the preparation of medicinal remedies, by communities living in Mopane woodlands of southern Angola¹⁶.





Table 1 – Plant species used by the N'dalatando community, in the Province of Cuanza Norte (Angola)

Scientific name	Local name	Indication	Part used	Preparation
<i>Persea americana</i> Mill.	Abacate	Hypertension, Parasites	Leaf; seed; fruit	Decoction; raw material
<i>Cucurbita pepo</i> L.	Abóbora	Prostate	Seed	Decoction
<i>Curcuma longa</i> L.	Açafrão	Hepatitis	Root	Maceration
<i>Nasturtium officinale</i> R.Br.	Agrião	Pneumonia	Leaf; seed; root	Maceration
<i>Lactuca sativa</i> L.	Alface	Heart problems; diarrhea	Leaf	Raw material
<i>Gossypium</i> sp.	Algodão	Ear pain; diarrhea; nausea	Leaf; seed	Infusion
<i>Allium sativum</i> L.	Alho	Cough; asthma; bronchitis	Bulb	Maceration
<i>Aloe ferox</i> Mill.	Aloé	Healing wounds; alopecia; pneumonia	Leaf	Raw material
<i>Ananas comosus</i> (L.) Merr.	Ananás	Diabetes; Indigestion	Fruit	Raw material
<i>Solidago chilensis</i> Meyen	Arnica do campo	Varicose veins	Leaf	ND
<i>Vernonia polysphaera</i> Baker	Assa-peixe	Respiratory problems	Leaf	Infusion
Unidentified species	Bambe	Respiratory problems	ND	ND
<i>Catharanthus roseus</i> (L.) G. Don	Beijo da mulata	Malaria; Cholera; Diabetes; Typhoid fever	Leaf	ND
<i>Atropa belladonna</i> L.	Beladona	Fungal diseases	Leaf	Infusion
Unidentified species	Bembrequete	Diabetes	ND	ND
<i>Beta vulgaris</i> L.	Beterraba	Anemia	Bulb	Decoction
Unidentified species	Boldo	Nausea; gastritis	Leaf; stem	Maceration
<i>Coffea</i> sp.	Café	Fatigue	Root	Maceration
<i>Anacardium occidentale</i> L.	Caju	Teeth pain; Diarrhea	Leaf; stem; root	Maceration; infusion; decoction
Unidentified species	Camuquina	Undefined pain	ND	Infusion

ND: No Data

(Continued)



Scientific name	Local name	Indication	Part used	Preparation
Unidentified species	Canami	Infectious disease	ND	Maceration
Unidentified species	Capim-de-deus	Respiratory disease	ND	ND
<i>Averrhoa carambola</i> L.	Carambola	Anemia; cholesterol	Leaf; fruit	Decoction
Unidentified species	Carapucho	Diabetes	ND	ND
Unidentified species	Casialata	Skin infection	Leaf	Raw material
Unidentified species	Cauya uya	Bleeding problems	Root	Decoction
Unidentified species	Caxetete	Cholera; diarrhea	ND	ND
<i>Allium cepa</i> L.	Cebola	Respiratory problems; bronchitis	Bulb	ND
<i>Cymbopogon citratus</i> (DC.) Stapf	Chá-de-cachimbe	Fever	Leaf	Decoction
<i>Melissa officinalis</i> L.	Cidreira	Gastritis; insomnia	Leaf	Maceration; decoction
Unidentified species	Cipo Kassau	Respiratory problems	ND	ND
<i>Aristolochia cymbifera</i> Mart.	Cipo-mil-homens	Malaria	ND	ND
Unidentified species	Cipo suura	Respiratory problems	ND	ND
<i>Cocos nucifera</i> L.	Coco	Hepatitis	Root	Decoction
<i>Cola acuminata</i> (P.Beauv.) Schott & Endl.	Cola	Pneumonia	Bulb	Raw material
<i>Brassica</i> sp.	Couve-china	Gastritis; typhoid fever	Leaf	Maceration
Unidentified species	Cuanana	Diabetes	ND	ND
<i>Taraxacum officinale</i> (L.) Weber ex F.H.Wigg.	Dente-de-leão	Diabetes; liver diseases	Leaf	Decoction; raw material
<i>Combretum cinereopetalum</i> Engl. & Diels	Dicaxi	Malaria; diabetes; liver diseases	Stem	Decoction; maceration
<i>Boerhavia diffusa</i> L.	Ditumbata	Malaria; hepatitis; cramps	Stem; leaf; root	Infusion; maceration, raw material
<i>Adansonia digitata</i> L.	Embondeiro	Malaria, diabetes; skin disease; fever	Stem; fruit	Infusion; maceration

ND: No Data

(Continued)



Scientific name	Local name	Indication	Part used	Preparation
Unidentified species	Erva de são Domingos	Malaria	ND	ND
Unidentified species	Espinheiro	Diarrhea	ND	Infusion
<i>Eucalyptus</i> sp.	Eucapilto	Cough; Fever; Diabetes	Leaf	Decoction
<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg	Fruta-pão	Diabetes	ND	ND
<i>Zingiber officinale</i> Roscoe	Gengibre	Nausea; weight loss; respiratory problems	Root	Maceration
Unidentified species	Gihã	Blood problems	Leaf; root	Maceration
<i>Capsicum annuum</i> L.	Gindungo	Pneumonia; typhoid fever	Seed; bulb	Maceration; raw material
<i>Monodora angolensis</i> Welw.	Gipepe	Digestive problems	Seed	Maceration; raw material
<i>Psidium guajava</i> L.	Goiaba	Diarrhea	Leaf; fruit	Raw material
Unidentified species	Guinonga	Malaria	ND	ND
<i>Alternanthera pungens</i> Kunt	Holokosso	Malaria	Leaf	Maceration
<i>Mentha</i> sp.	Hortelã	Nausea; cough	Leaf	Infusion
Unidentified species	Jasmini Amarelo	Diabetes	ND	ND
Unidentified species	Kabuabuata	Malaria	ND	ND
Unidentified species	Kandua grande	Lepra	Root	Maceration
<i>Ocimum gratissimum</i> L.	Kimbuma	Fever; Malaria	Leaf	Infusion
Unidentified species	Kimpuanguale	Lepra	ND	Maceration
Unidentified species	Kingigima	Hepatitis; Malaria	ND	Maceration
Unidentified species	Kintamba	Bronchitis	Root	Decoction
Unidentified species	Kumpidi (pimento)	Diarrhea; fever; bladder pain	Seed	ND

ND: No Data

(Continued)



Scientific name	Local name	Indication	Part used	Preparation
Unidentified species	Leitoso	Anemia	ND	ND
<i>Citrus</i> sp.	Limão	Flu; cough; throat pain	Fruit	Raw material
Unidentified species	Lingua-de-boi	Gastritis	ND	ND
Unidentified species	Lingua-de-cão	Child diseases	Root	Decoction
Unidentified species	Lumpiilu npilu	Wounds	Leaf	Maceration
Unidentified species	Macunde	Diabetes	Leaf	ND
<i>Brillantaisia owariensis</i> P.Beauv	Malemba lemba	Gastritis	Leaf	Maceration
Unidentified species	Malulu	Malaria; hepatitis	Leaf	ND
Unidentified species	Mambuso	Undefined pain	Leaf; root; flower	Maceration
<i>Mangifera indica</i> L.	Manga	Diarrhea; bronchitis	Stem; leaf	Infusion; maceration
Unidentified species	Mansusua nsusua	Bronchitis	Leaf	Infusion
Unidentified species	Manua nsongue	Spleen problems	Leaf	Maceration
<i>Cochlospermum angolense</i> Welw. ex Oliv.	Mbrututu	Malaria; hepatitis	Root; stem	Maceration; decoction
<i>Alchornea cordifolia</i> (Schumach. & Thonn.) Müll.Arg.	Mbungji	Teeth pain	Leaf	Decoction
<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai	Melancia	Cold	Fruit; seed	ND
Unidentified species	Melva	Lungs; diabetes	ND	ND
<i>Moringa oleifera</i> Lam.	Moringa	Heart; fever; diabetes; typhoid fever	Leaf; seed; root	Infusion; raw; decoction
<i>Dacryodes edulis</i> (G.Don) H.J.Lam	Mubafo	Diarrhea; diabetes	Sap	Raw material
<i>Croton mubango</i> Müll.Arg.	Mubango	Pain; typhoid fever	Leaf	Maceration
Unidentified species	Mubunga wanga	Malaria; diabetes	ND	ND
Unidentified species	Mucuna	Diabetes	ND	ND

ND: No Data

(Continued)



Scientific name	Local name	Indication	Part used	Preparation
Unidentified species	Mudia buinge	Diabetes	ND	ND
<i>Senna occidentalis</i> (L.) Link	Mudianhoca	Malaria; cramps	Leaf, root	Maceration; infusion
<i>Ocimum</i> sp.	Muelele	Fever	Leaf	Infusion
<i>Jatropha curcas</i> L.	Mufulukua	Teeth pain; skin wound	Leaf; root	Decoction
Unidentified species	Mugongonde	Diabetes	ND	ND
<i>Lannea welwitschii</i> (Hiern) Engl.	Mukumbi	Cough; hepatitis; bones	Stem; leaf	Decoction; maceration
<i>Piliostigma thonningii</i> (Schumach.) Milne-Redh.	Mulolo	Infectious diseases; skin allergy; pain	Leaf	Infusion
Unidentified species	Mulongo	Lepra	Stem	Maceration
<i>Gymnanthemum amygdalinum</i> (Delile) Sch.Bip. ex Walp.	Mululu	Malaria; cough; pain; intestinal parasites	ND	Maceration; raw material; infusion
Unidentified species	Mulungo	Diabetes	ND	ND
Unidentified species	Mundende	Lepra	Leaf	Raw material
Unidentified species	Munemuenji	Intestinal cleansing	ND	ND
Unidentified species	Musambela	Gastritis	ND	ND
<i>Momordica charantia</i> L.	Mussequenha	Typhoid fever	Leaf	Maceration; Infusion
Unidentified species	Mussunda	Thrombosis; undefined pain	Root	Maceration
<i>Vitex</i> sp.	Muxilo-xilo	Diabetes; fever; lepra	Leaf	Maceration; decoction
<i>Gardenia ternifolia</i>	Ndai	Cough; lepra; inflammation	Stem	Maceration; raw material
<i>Albizia cf. lebbeck</i> (L.) Benth.	Ndendo	Tooth decay; diabetes	ND	ND
Unidentified species	Ndongo	Diabetes	ND	ND
<i>Azadirachta indica</i> A.Juss.	Neem	Malaria; hepatitis; diabetes; hemorrhoids	Leaf	Infusion; maceration

ND: No Data



(Continued)

Scientific name	Local name	Indication	Part used	Preparation
Unidentified species	Nespera	Hypertension; Diabetes	ND	ND
<i>Garcinia mannif</i> Oliv.	Ngadiadia	Pains	ND	ND
Unidentified species	Nganza	Utero problems	Root	Decoction
Unidentified species	Nganzi	Typhoid fever; malaria; pain	Stem	Maceration
Unidentified species	Nhamba nhamba	Teeth pain; Blood disorders	Root	Decoction; infusion
Unidentified species	Nlongua	Back pain	Stem	Maceration
Unidentified species	Nlonlombulo	Bronchitis; bladder pain	Root	Decoction
Unidentified species	Nlono	Bronchitis	Leaf	Infusion
Unidentified species	Nsangu nsangu	Bronchitis	Leaf	Infusion
Unidentified species	Ntontososi	Stomach pain; ear pain	Leaf	Maceration
Unidentified species	Nulunda Michi	Respiratory problems	ND	ND
Unidentified species	Oya	Eye problems	ND	ND
Unidentified species	Paco	Malaria	ND	ND
Unidentified species	Pão tibia	Fatigue	Stem	Maceration
<i>Carica papaya</i> L.	Papaia	Skin wounds; malaria; hepatitis	Leaf; seed; fruit; root	Maceration; decoction
Unidentified species	Pé-de-elefante	Diabetes	ND	ND
Unidentified species	Penga-pinto	Malaria	ND	ND
<i>Opuntia stricta</i> (Haw.) Haw.	Pitela	Diabetes; hepatitis	ND	Infusion
Unidentified species	Repolho	Diabetes; back pain	Leaf	Infusion
<i>Punica granatum</i> L.	Romã	Cholera; diarrhea; teeth pain	Fruit	Infusion

ND: No Data

(Continued)



Scientific name	Local name	Indication	Part used	Preparation
<i>Sambucus</i> sp.	Sabugueiro	Cough; asthma; skin allergy; measles	Leaf; flower	Decoction
<i>Chenopodium ambrosioides</i> L.	Santa-maria	Fever, cough; malaria; pain	Leaf	Infusion; maceration
<i>Combretum</i> sp.	Tacange	Teeth pain	ND	Decoction
<i>Tamarindus indica</i> L.	Tambarineiro	Hepatitis; malaria; diabetes	Fruit	Raw material
Unidentified species	Teve-teve	Respiratory problems	ND	ND
<i>Solanum lycopersicum</i> L.	Tomate	Prostate	Bulb	Raw material
<i>Adenia lobata</i> (Jacq.) Engl.	Tonga-tonga	Rheumatism	Leaf	Raw material
Unidentified species	Tuzequieto	Constipation	Leaf	Maceration
<i>Calatropsis procera</i> (Aiton) W. T. Aiton	Umpulukua	Malaria	ND	ND

ND: No Data

In African traditional systems of medicine, plant preparations in the forms of decoctions, concoctions, macerations, or infusions are used to treat a wide range of diseases²⁵. In this study, and among several preparation methods, the most frequent was maceration (37.7 %), followed by infusion (23.7 %), decoction (21.9 %) and raw material (16.7 %). It is known that administration methods vary from community to community, from healer to healer and from disease to disease. Therefore, by contrast, the study of Lautenschläger et al., (2018) showed that using a decoction to prepare a remedy was the most frequently found method of preparation²².

The oral administration route (65.8%) was the most used in the N'dalatando region for taking the plant preparations, followed by topic application (28.9%) and enema (5.3%). These results are in accordance with other reports²¹, specially with the study of Lautenschläger et al., (2018) while nearly half of all preparations are administered orally (45%), followed by dermal application (20 %) and only 16 % is an enema used²².

Ailments treated by plants

The population in the N'dalatando region traditionally uses plants for the treatment of various diseases. All the recorded ailments were grouped into major ailment categories (Table 2). The main categories of use were certain infectious and parasitic diseases (e.g., Malaria, Lepra, Cholera) (20.3 %); diseases of the digestive system (17.3 %); endocrine, nutritional, and metabolic diseases (15.3 %); symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (15.3 %); and diseases of the respiratory system (14.8 %). The results observed in this study are similar to those of Urso et al., (2016) which demonstrated that medicinal plants were mainly used to treat disorders of the gastrointestinal tract, obstetric and gynecological problems, and respiratory diseases¹⁶.

To explore the potential clinical application of medicinal plants, it is important to link its traditional use with rigorous evidence-based scientific studies. For some of the species with more citations, the uses cited by the informants showed some similarity to the investigated effects/actions, demonstrating concordance between popular knowledge and academic science.

In the case of Mukumbi (*Lannea welwitschii* (Hiern) Engl.) the informants use this plant for cough, hepatitis, and bone fractures. According to the literature, this plant is found growing in deciduous and secondary forests of Africa from Côte d'Ivoire to Cameroons and extending to Uganda and Angola. Decoction of the leaves is used for the treatment of diarrhea, dysentery, swellings, gout, gingivitis, topical infections, and wounds²⁶; the roots can be used in nasopharyngeal infections and as emetics; and the stem bark, which contain tannins and saponins, has antidiarrheal property²⁷.



Table 2 – Ailments for which informants use botanical remedies

Category	Ailment	%
Certain infectious and parasitic diseases	Infections, parasitosis	20.5
Diseases of the digestive system	Constipation, diarrhea, stomach pain, hepatic disorders, digestion; gastritis; Intestinal cleansing	17.5
Endocrine, nutritional, and metabolic diseases	Diabetes, weight loss	15.5
Diseases of the respiratory system	Asthma, cold, cough, sore throat, bronchitis	15.0
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	Fever, teeth pain, inflammation, pain	14.5
Diseases of the skin and subcutaneous tissue	Wounds, skin allergy	4.0
Diseases of the circulatory system	Hypertension, heart disorders; hemorrhoids; varicose veins	3.5
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	Anemia; blood disorders	3.0
Diseases of the musculoskeletal system and connective tissue	Rheumatism, back pain, bone fracture	2.0
Diseases of the genitourinary system	prostate problems, bladder pain menstrual	2.0
Diseases of the ear and mastoid process	Ear pain	1.0
Diseases of the nervous system	Insomnia	0.5
Pregnancy, childbirth, and puerperium	Utero problems	0.5
Diseases of eye and adnexa	Eyes problems	0.5



Regarding Santa-maria (*Chenopodium ambrosioides* L.) the informants use this plant for fever, cough, malaria, and pain. Cysne et al., (2016) showed that the crude hydroalcoholic extract from the leaves of *C. ambrosioides* exhibited a significant antiplasmodial effect and may be considered as a potential candidate for the development of new antimalarial drugs²⁸. Some effects of *C. ambrosioides* have been confirmed, such as its anti-inflammatory, anti-nociceptive²⁹, and anti-microbial activity against, for example, *Plasmodium falciparum*²⁸. Finally, Ditumbata (*Boerhavia diffusa* L.) was also cited by some informants for the treatment of malaria, hepatitis, and cramps. However, in Ayurvedic literature, this plant is claimed to be rejuvenative to the urinary system. Experimental studies have also demonstrated its diuretic and possible nephroprotective effects against acetaminophen-induced renal damage³⁰.

CONCLUSION

People in Angola still depend very much on biodiversity, and the knowledge of how to use plants in their daily life is fundamental. The present study demonstrates that N'dalatando (Cazengo) in the Province of Cuanza Norte (Angola), due to its geographical and cultural diversity, has a rich traditional plant knowledge that can be important for treating a wide range of human ailments. This study provides an important contribution of traditional knowledge documentation, particularly because traditional knowledge is expected to be lost in future. Although some species cited by the informants are well known scientifically, it is interesting that others have been studied little or nothing to confirm their purported medicinal properties. Further investigation is necessary to evaluate the pharmacological potential of the plants and to improve self-medication practices in the future.

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