

(RESEARCH ARTICLE)



Catalog of antidiabetic medicinal plants from the endogenous knowledge of the Wongos of the Idiofa territory in the DR Congo

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Abstract

During two campaigns (2016 and 2018), ethnobotanical surveys of medicinal plants were carried out among the Wongo of the Kipuku Sector Idiofa Territory. They consisted in identifying medicinal plants used in traditional medicine in the treatment of diabetes.

Thirty species have been identified. They are grouped in 29 genera and 21 families among which the Fabaceae, Apocynaceae, Rubiaceae and Clusiaceae are predominant. They all belong to the phylum Spermatophyta.

The predominant methods of preparation are decoction, pounding, maceration and sieving.

The information collected could constitute a database for subsequent research. Indeed, the extraction and identification of new natural active ingredients against diabetes constitute the next stage of the study.

Keywords: Diabetes; Medicinal Plants; Ethnobotany; Wongo People; Kipuku Sector

1. Introduction

Diabetes currently affects around 4% of the world's population and could rise to 5.4% by 2025 [1]. Characterized by permanent hyperglycaemia, this metabolic anomaly is due to a deficit of insulin secretion (Type 1) or to poor use of secreted insulin (Type 2). [2].

WHO encourages the intensification of research into avenues, including those using traditional herbal treatments [3].

This ethnobotanical study aims to fill the void given that the Kipuku sector has not yet been the subject of an ethnobotanical study. A list of medicinal plants used in the traditional treatment of diabetes is established in order to enhance them through the subsequent production of improved traditional medicines.

2. Material and methods

2.1. Description of the study area

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Kipuku is a sector of the territory of Idiofa in the province of Kwilu in DR Congo located between two large rivers Lubwe and Loange commonly called Katembo. Covering an area of 1775 Km². It is bounded to the north by the Kapia sector, to the south by the Belo and Madimbi sector, to the east by the Mapangu sector of Western Kasai and to the west by the Banga and Musanga Idiofa sectors.

Its geographical coordinates are:

- Latitude: 4° 53' and 6° 0' South;
- Longitude: 19° 0' and 20° East;
- Altitude: 600 to 700 m above sea level.

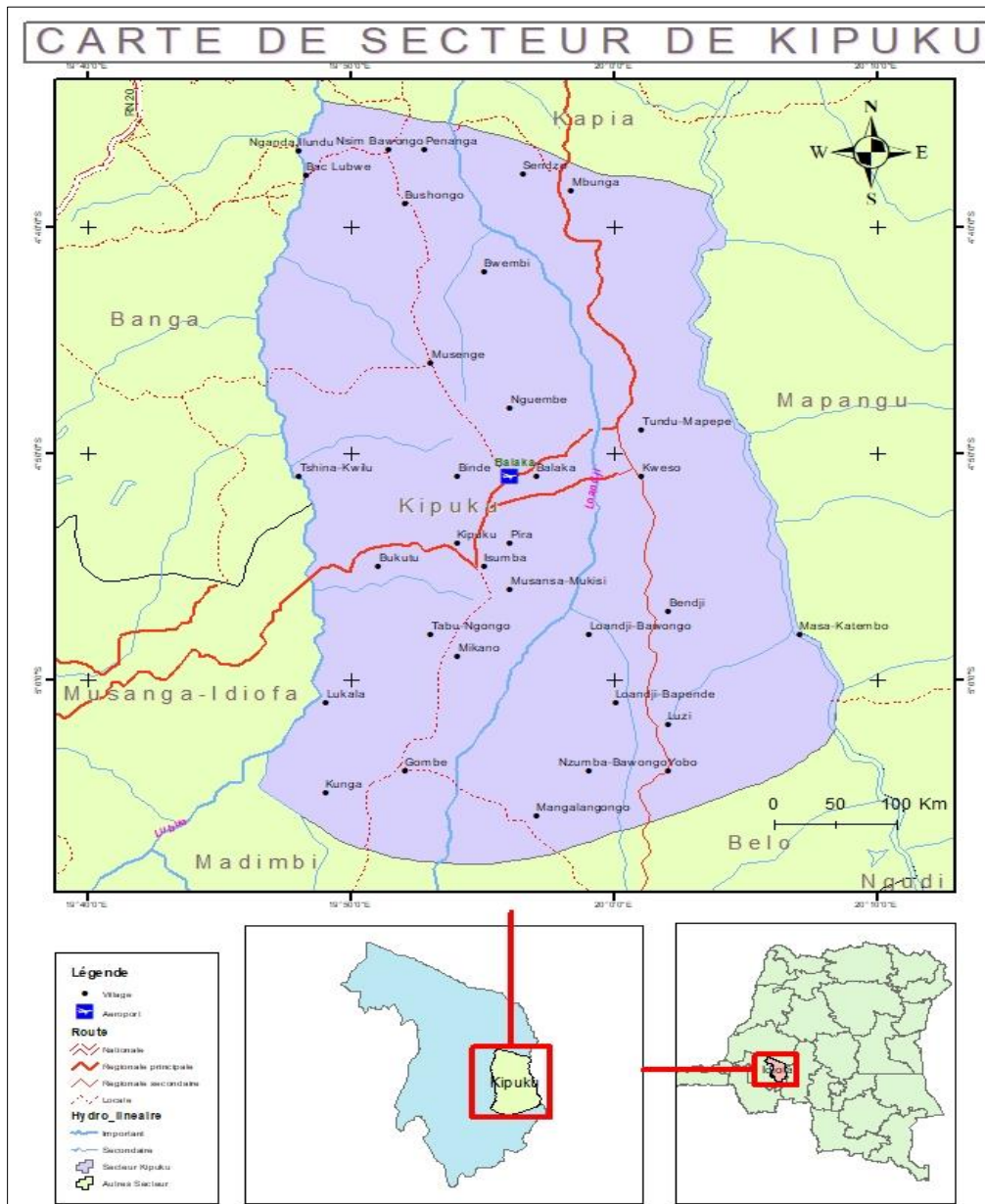


Figure 1 Administrative map of the Kipuku sector

2.2. Methods

2.2.1. Ethnobotanical survey

For the collection of data relating to this research, we collected ethnobotanical information from men aged 40 and over, traditional healers, herbalists, and people who have suffered or are suffering from diabetes. Information on antidiabetic medicinal plants focused on the vernacular names of the species, the part of the plant used in the recipe, the procedure, the dosage and other elements used in the preparation of recipes.

2.2.2. Plant identification

The harvested plants were determined by ourselves with the collaboration of colleagues from the Biology Department and confirmed at the INERA Herbarium at the University of Kinshasa.

3. Results

The botanical collections carried out in the field from 2016-2018 made it possible to identify 30 plant species commonly used in the treatment of diabetes in the Wongo people (Table 1)

Table 1 Medicinal plants used in the treatment of diabetes in the region studied

Scientific name	Common name	Part used	Form administered	Number of quotes
<i>Allium cepa</i> L.	Matungulu	Bulb	Decoction	1
<i>Anthocleista schweinfurhtii</i> Gilg.	Okal (Mbuun)	Fruit	Crushing, sieving and maceration	1
<i>Carica papaya</i> L.	Paypay (multiple languages)	Sheet	Decoction	1
<i>Catharanthus roseus</i> (L.) G. Don	Kintuntu (Kikongo)	Root	Maceration	1
<i>Centella asiatica</i> (L.) Urb		Sheet	Believed	1
<i>Chrysophyllum lacourtianum</i> De Wild.	Dibamfu (Kikongo)	trunk bark	Decoction	1
<i>Citrus limon</i> (L.) Burme	Munokonangandu (Kikongo)	Fruit	Juice	1
<i>Colletocema dewevrei</i> (DC Wild.) Small	Mpampr'Nguer (Wongo)	Root	Crushing, sieving and maceration	1
<i>Costus afer</i> Ker Gawl.	Mikake (Wongo) Misangala(Kikongo)	Stem	Crushing, Extraction	1
<i>Crossopteryx febrifuga</i> Benth.	Ntweth (Wongo)	trunk bark	Maceration	1
<i>Funtumia africana</i> (Benth.) Stapf	Bubwera (Wongo)	trunk bark	Decoction	1
<i>Garcinia huillensis</i> Welw. Ex Olive	Ngi-ngion (Mbuun), Munginduwatemu (Pende)	Root	Decoction	1
<i>Garcinia kola</i> Hackel.	Butenth (Wongo), Nten (Mbuun)	Fruit, Trunk Bark	Raw, Decoction, Pounding, Sifting and Maceration	3
<i>Gnetum africanum</i> Welw .	Mfubwa (Several languages in the DRC)	Sheet	Cooked, pounding, sifting, maceration	2

<i>Hymenocardia acida</i> Tul .	Muetshi (Wongo), Muheta (Pende), Ekos (Mbuun)	Root, trunk bark	Maceration	2
<i>Milicia excelsa</i> (Welw.) C.Berg	Bruntu (Wongo), Mulundu (Pende, Kikongo)	trunk bark	Decoction, sap	3
<i>Morinda morindoides</i> (Bak)	Konkburur (Wongo), Kongobululu (Kikongo)	Root	Decoction	1
<i>Ocimum basilicum</i> L.	Lumbalumba (Kikongo, Lingala), Onsunsus (Mbuun)	Root	Decoction	1
<i>Pancovia laurentii</i> (De Wild.) Gilg	Irweth (Wongo)	trunk bark	Decoction, pounding, sieving	3
<i>Passiflora quadrangularis</i> L.	Maracuja	Sheet	Decoction	1
<i>Pentaclethra macrophylla</i> Benth	Busanka (Wongo) Mushinga (Pende)	Fruit	Calcination	1
<i>Psophocarpus scandens</i> (Endl.) Verdc .	Kikalakasa (common to all the languages of the province of Kwilu, Kwango and Kongo central)	Fruit	Calcination	1
<i>Quassia africana</i> (Baill .) Baill	Nyermu-Ntomp (Wongo), Mukilankumbi (Mbuun), Mupesipesi (Kikongo)	Root	Decoction, maceration, pounding, sifting, maceration	3
<i>Rauvolfia vomitoria</i> Afzel.	Buntontonto (Wongo), Mundondondo (Pende), Onndundun (Mbuun)	Root	maceration, pounding	2
<i>Scorodophloeus zenkeri</i> Harms.	Piri (Wongo), Mukubi (Kikongo)	trunk bark	Decoction	2
<i>Senna siamea</i> (Lam.) Irwin and Barneby	Kintuntu (Kikongo)	Root	Decoction	1
<i>Syzygium guineense subs guineense</i> (Wild.) DC	Somp (Wongo , Mbuun), Sompo (Pende)	trunk bark	Crushing, maceration, decoction	2
<i>Tephrosia vogelii</i> Hook.F	Budion (Wongo), Mbaka (Kikongo)	Sheet	Crushing, sieving, maceration	2
<i>Trichilia gilgiana</i> Harms.	Buntshwel (Wongo)	trunk bark	Crushing, maceration, decoction	2
<i>Vernonia amygdalina</i> Del.	Gneyompo (Wongo), Obubul (Mbuun)Mukadikadi (Kikongo)	Sheet	Juice	1

The plants inventoried are presented in the catalog according to the scientific name, the vernacular name, and the reported use. The trunk bark is the most used plant organ used in local therapy in the region. It is followed by root, leaf, fruit/seed and finally the bulb and stem. Decoction is the procedure most used in the preparation of recipes, followed by pounding, maceration and sieving, without treatment, cooking and finally calcination. *Garcinia kola*, *Milicia excelsa*, *Pancovia laurentii* and *Quassia africana* are cited three times, by traditional healers (Table 1), *Gnetum africanum*, *Hymenocardiaacida*, *Rauvolfia vomitoria*, *Scorodoploeus zenkeri*, *Syzygium guineense*, *Tephrosia vogelii* and *Trichilia gilgiana* mentioned twice and the other species only once.

The 30 plant species are used in herbal medicine for diabetes by the wongo in the Kipuku Sector, including the trunk bark for 11 species, the root for 9 species, the leaf for 6 species, the fruit/seed for 5 species and the bulb and stem for 1 species each. In addition, 18 plant species are used alone in the preparation of medicines and 12 others are used in

combination, of which 2 species (*Garcinia kola* and *Quassia africanum*) are used alone or in combination in the recipes. Thus, there are 26 recipes based on a single plant and 8 recipes in combination of plants, of which the decoction is the most used mode of preparation, water the most used solvent for the preparation of recipes and the oral route. The mode of administration of remedies most used by the population.

4. Discussion

In DR Congo, research into hypoglycemic plants has experienced significant growth in recent years through ethnopharmacological surveys that have covered almost the entire country.

The cultural richness of the DR. Congo through its history, and its very rich biodiversity linked to its geographical location and climate has enabled it to have very extensive traditional knowledge in the field of herbal medicine for chronic diseases, and diabetes in particular, the number of medicinal plants antidiabetics identified to date, testifies to the importance of traditional medicine in the Congolese health system, regardless of urban or rural areas.

Much research has been conducted on the inventory of antidiabetic plants [4]-[6].

As part of this study, the ethnobotanical survey undertaken among elderly men, traditional healers, herbalists, practitioners and people who have suffered or are suffering from diabetes has identified 30 plant species with antidiabetic properties in the territory of Idiofa. It can be observed that most of them are used by the peoples of other African countries for similar or similar prescriptions:

In Benin, 130 antidiabetic species have been identified, including *Carica papaya*, *Catharanthus roseus*, *Hymenocardia acida*, *Milicia excelsa*, *Morindamorindoides*, *Ocimum gratissimum*, *Rauvolfia vomitoria* and *Vernonia amygdalina* [7];

In Côte d'Ivoire, of the eighteen identified antidiabetic plant species, [8] include *Catharanthus roseus*, *Cassia senna*, *Moringa oleifera* and *Phyllanthus amarus*. Still in Ivory Coast, *Crossopteryx febrifuga*, *Morinda morindoides* and *Senna siamea* the following were cited in a collection of 11 medicinal plants from northern Ivory Coast [9].

In Senegal, [10] recognized *Alchornea cordifolia*, *Anacardium occidentale*, *Ipomoea batatas* and *Momordica charantia* as hypoglycemic plants in the traditional pharmacopoeia;

In Madagascar, [11] mentions *Pothos chapelri* in the treatment of diabetes mellitus;

Studies carried out in Morocco also recognize that certain plant species have antidiabetic properties, in particular *Trigonelle foenum*, *Momordica charantia*, *Urtica pilulifera*, *Corandrum sativum*, *Ocimum sanctum*, *Glyrrhiza uralensis*, *Cinamomon cassia*, *Olea europae*, *Nigella sativa*, *Allium cepa*, *Artemisia absinthium*, *Brassica oleracea* [6]; [12]; [13].

In Cameroon, [14] collected 30 medicinal plants sold in Douala markets, including *Anthocleista schweinfurhtii*, *Carica papaya* and *Garcinia kola*;

In the Central African Republic, [15] worked on medicinal plants used in the treatment of arterial hypertension by traditional healers in Bangui. Of the 33 inventoried species, 4 appear on the Idiofa inventory. Let us mention in particular: *Catharanthus roseus*, *Hymenocardia acida*, *Rauvolfia vomitoria* and *Senna siamea*

In Togo, ethnobotanical data on antidiabetic plants provide information on 112 plant species belonging to 51 families. The most cited species are *Allium sativum*, *Allium cepa*, *Guilandina bonduc*, *Moringaoleifera* and *Picralima nitida*. In terms of recipes, 132 recipes are prepared from the 112 species of plants in this collection. Single plant recipes are 78 (69%) while 54 species (30.4%) are prescribed in combination. The most used organs are the leaves followed by the roots. Decoction is the primary method of preparation [16].

In DR. Congo, [17] listed 39 medicinal species in the Lukunga District. Four of them are on the Idiofa list. These are: *Garcinia huillensis*, *Garcinia kola*, *Ocimum basilicum* and *Quassia africana*. [5] reported the use of *Mangifera indica*, *Morinda morindoides* and *Tetracera poggei*, *Craterispermum laurinum*, *Ongokea gore*, *Polycarpacea corymbosa* and *Triclisia spp.* as a hypoglycaemic plant in Western Kasai. In Kivu, Schneide, [18] revealed the presence of *Spathodea campanulata* in the traditional treatment of diabetes mellitus. Among 33 plant species inventoried in the treatment of diabetes mellitus in Kinshasa Mandango and Collaborators [4], retain the following species: *Albizia adianthifolia*, *Annona senegalensis*, *Bridelia ferruginea*, *Cassia occidentalis*, *Crossopteryx febrifuga*, *Hymenocardia acida*, *Mangifera*

indica, *Maprounea africana*, *Morinda lucida*, *Morinda morindoides*, *Musanga cecropioides*, *Nauclea latifolia*, *Rauvolfia obscura*, *Rauvolfia vomitoria*, *Schwenkia americana*, *Palisota schweinfurthii*.

The works, from [5] in Western Kasai, from [19] in Kisangani, from [20] in the territory of Kwilu-Kamtsha, on medicinal plants complete the work of Western missionaries of colonial periods and post-colonial.

In the territory of Idiofa some works of Catholic missionaries are noted [21]. Without any proven contact, the peoples of distant countries have produced knowledge that reveals current aspects of their respective social lives. The convergence of the use of these species reflects a certain credibility relating to their effectiveness. The forest and savannahs of Africa in general and those of the DRC in particular still close secrets to be revealed with its botanical biodiversity through ethnobotanical research.

Unlike the works cited above, this study focuses on medicinal plants used exclusively in the treatment of diabetes, although they are also used for other pathologies. However, many works on antidiabetic plant species have already been carried out elsewhere.

This study identified 30 plant species and 21 families from 2016-2018, as medicinal plant species used to cure diabetes in the territory of Idiofa.

Of the 21 families listed, the Fabaceae (5species, 23.8%), Apocynaceae (3species, 14.3%), Rubiaceae (3species, 14.3%), Clusiaceae (2species, 9.5%). The other families represented by 1 species (4.8%): Asteraceae, Caricaceae, Lamiaceae, Loganiaceae, Meliaceae, Moraceae, Myrtaceae, Passifloraceae, Phyllantaceae, Rutaceae, Sapindaceae, Sapotaceae, Simaroubaceae, Liliaceae, Zingiberaceae and Gnetaceae are antidiabetic families listed. This representativeness in medicinal species which corroborates other work [19;22], [23, 24, 25] retains Asteraceae, Fabaceae, Rubiaceae and Apocynaceae among the seven most represented families in medicinal plants. The Rubiaceae family has been retained as the most sought after to treat febrile syndromes [20]. Rubiaceae and Fabaceae constitute essentially medicinal families and pass among the families represented by a large number of species. These observations join our analyzes which place the Fabaceae in the first position followed by the Rubiaceae, the Apocynaceae and the Clusiaceae in the floristic solicitude by the communities of the territory of Idiofa to fight against chronic diseases, particularly diabetes.

In DR.Congo, research into hypoglycemic plants has experienced significant growth in recent years through ethnopharmacological surveys that have covered almost the entire country.

The cultural richness of the DR. Congo throughout its history, its very rich biodiversity linked to the geographical location and the climate has enabled it to have very extensive traditional knowledge in the field of herbal medicine for chronic diseases, and diabetes in particular, demonstrated by the number of plants identified antidiabetic medicines, which testifies to the importance of traditional medicine in the Congolese health system.

5. Conclusion

Diabetes is a major public health problem in the DR. Congo. Although the development of modern medicine has resulted in the arrival of modern drugs including insulin, oral antidiabetics, however for socio-economic and cultural reasons a significant proportion of the Congolese population depends on medicinal plants for their treatment. both in rural and urban settings, as estimated by the WHO.

The massive exploitation of medicinal plants by the Wongo populations of the Kipuku sector confirms the fact that medicinal plants are used in traditional therapy.

The use of phytotherapy is frequent in the therapeutic arsenal in diabetics, but this use must be based on scientific studies while specifying the mechanism of action of the plants, the therapeutic and toxic dose; medicinal plants undoubtedly represent a potential source of hypoglycemic substances but they can also reveal sometimes fatal toxic side effects requiring continuous vigilance.

The scientific and industrial sectors must make efforts to unlock the secrets of the panoply of bioactive molecules, naturally present in the plant kingdom, in the hope of developing potentially effective drugs in the management of the treatment of diabetes at the lowest cost.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest be the authors of this manuscript.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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