



Ethnobotanical study of *Acalypha wilkesiana* (Euphorbiaceae), a plant used in the treatment of arterial hypertension in Oyem in Northern Gabon

Wensleslace Landry Mve Mendame^{*1}, Boris Achille Eyi Mintsa¹,
Alban-Michel Nguema Nguema¹, Arnaud Brice Pambo Pambo¹. ET Ibrahim¹

¹Laboratoire de Physiologie Animale : Électrophysiologie-Pharmacologie, Unité de Recherche Agrobiologie, Université des Sciences et Techniques de Masuku (USTM), Franceville, Gabon

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Abstract

Cardiovascular diseases, in particular arterial hypertension, are one of the causes of mortality and morbidity in the world, the impact of the treatment is very important, for this the poor populations have difficulties and turn to traditional therapists for treat these pathologies using plants. Thus, our investigations on the use of plants, in the form of an ethnobotanical survey, were carried out in the town of Oyem with 50 people questioned, composed of men (84%) and women (16%) with an age varying between 43 and 75 years. At the end of this investigation, 10 plants were inventoried but *Acalypha wilkesiana* which is the main object because of its high frequency of use will be studied in particular. The species *A. wilkesiana* is used to treat several conditions, particularly hypertension. Regarding the organs, the leaves are the most used parts of the plant (93%). The treatment is administered in the form of a decoction (54%) and maceration (40%). These results constitute a database for carrying out phytochemical and biological tests in the search for new bioactive antihypertensive molecules in plants.

***Corresponding Author:** Wensleslace Landry Mve Mendame ✉ landry201414@gmail.com

Introduction

The effectiveness of phytotherapy is proven and its health benefits have allowed traditional medicine to enter our habits (Bene *et al.*, 2016). Nowadays, the use of traditional herbal medicine is experiencing renewed interest in Western countries, particularly to treat the imbalances caused by modern life (Adomou *et al.*, 2012; Bene *et al.*, 2016).

Indeed, some work (Olou *et al.*, 2018) has shown that plants were used not only for their nutritional values but also for their properties in the treatment of certain pathologies such as cardiovascular diseases.

However, despite the efforts made in this area, cardiovascular diseases are one of the leading causes of death worldwide. More than 80% of deaths from cardiovascular diseases occur in developed and developing countries (WHO, 2011).

High blood pressure is one of the cardiovascular diseases that currently affects more than a quarter of the world's population. Worldwide, the total number of people affected would increase from 171 million in 2000 to 366 million in 2030 if nothing is done (Ueli *et al.*, 2008).

The prevalence of hypertension in sub-Saharan Africa is very high among adults aged 18 and over, varying between 16% and 40%. This prevalence is over 60% in people over 65 (Houehanou *et al.*, 2018). In Gabon, Mipinda *et al.* (2013) report that high blood pressure affects 22.64% of the population.

In view of this health contact, the lack of specialists, the scarcity or non-existence of health centers and the high cost of pharmaceutical products, populations resort to traditional medicine using plants. The promotion of traditional medicine is thus of growing interest, because according to the WHO (2011), nearly 80% of populations depend on traditional medicine.

The objective of this work is to give a scientific basis to *Acalypha wilkesiana* in the treatment of arterial hypertension through an ethnobotanical investigation.

Material and methods

Study zone

The study was carried out in the province of Woleu-Ntem (Gabon), in the Department of Woleu more precisely in the town of Oyem (fig. 1). The city of Oyem located in the North of Gabon, covers an area of 38,465 km² with 80,000 inhabitants. The climate is equatorial with vegetation characterized by forests and extensive grassy areas.

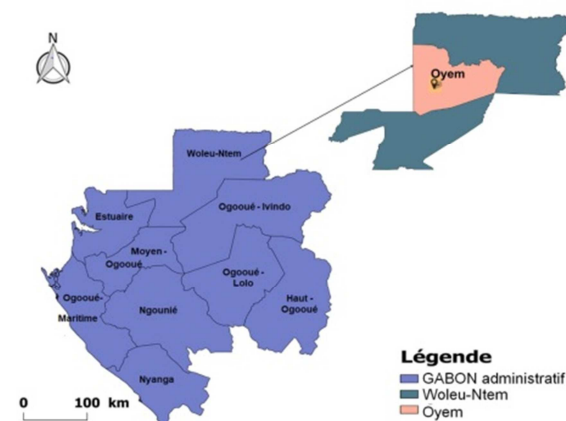


Fig. 1. Gabon administrative map.

Ethnobotanical survey

The survey on the use of *A. wilkesiana* was carried out among traditional healers and natives of the town of Oyem (northern Gabon). As an approach used, we visited the healers and proceeded by interview via a survey sheet developed at the Laboratory of Animal Physiology: Electrophysiology-Pharmacology. The information related to the use of the plant to fight against hypertension. This technical information sheet provides information relating to the species, in particular the vernacular name, the plant organ used, the method of preparation and the dosage. The harvested plant was identified by Dr Ikabanga Davy, then kept in the herbarium of the Department of Biology.

Selection criteria

The choice of *Acalypha wilkesiana* for our study was based on three pre-established criteria: the availability of the plant species in the field, the frequency of use and the therapeutic effectiveness according to traditional healers or not.

Data analysis

- The frequency of plants listed was calculated in relation to the number of times a species is

mentioned for the treatment of hypertension during the interview.

Results

Ethnobotanical survey

Ethnobotanical characteristics

During the ethnobotanical survey, information about plants with antihypertensive effects was provided by 50 individuals from Oyem town. The ethnobotanical characteristics relating to the plants, the different parts used, and the methods of preparation and administration of the medicinal recipes are described in figs 3, 4 and 5.

Breakdown of people surveyed by gender

During the survey, 50 people were questioned about the use of plants used in the treatment of high blood pressure. These people are unequally distributed according to socio-professional characteristics, age and gender. Taking gender into account, the percentage of men interviewed, i.e. 84%, is higher than that of women, i.e. 16% (Fig. 2).

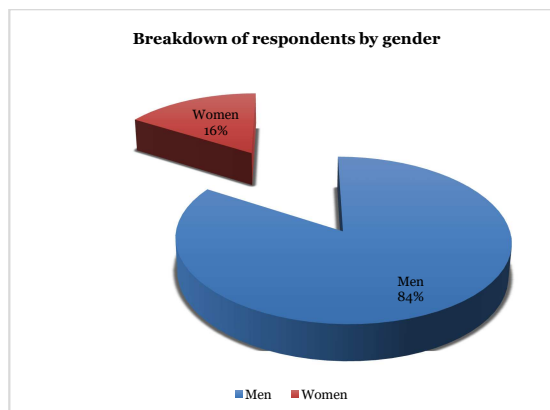


Fig. 2. Breakdown of respondents by gender.

Different plants inventoried and harvested

During this investigation, we inventoried 10 plants (Table 1), namely: *Acalypha wilkesiana*, *Annona muricata*, *Citrus aurantiifolia*, *Cymbopogon citratus*, *Dacryodes edulis*, *Mangifera indica*, *Persea americana*, *Psidium guajava*, *Terminalia catappa*, *Theobroma cacao* and *Vernonia calvaona*. These species are used in the treatment of several pathologies such as: headaches, diabetes, flu, stomach aches, diarrhea, toothaches and hypertension.

Table 1. Uses of plants in traditional medicine.

Species name	Family	Common name	Organs	Pathologies treated	Preparation
<i>Acalypha wilkesiana</i>	Euphorbiaceae	Aniane	Fe, R	Headaches, diabetes, fevers, hypertension	Decoction, maceration
<i>Annona muricata</i>	Annonaceae	Ebôm	Fe, Fr, Gr, T	Hypertension, stomach pain, toothache, diabetes, fever	Raw, decoction, maceration
<i>Citrus aurantiifolia</i>	Rutaceae	Alosse	Fe, Fr, T	Hypertension, diabetes, cough, flu	Raw, decoction, maceration
<i>Cymbopogon citratus</i>	Poaceae	Ossang ntane	Fe, R	Hypertension, fever, cough, diabetes	Infusion, decoction, inhalation
<i>Dacryodes edulis</i>	Bursaceae	Ossè	Fe, Ec, Fr	Hypertension, diarrhoea, toothache, headache, diabetes	Cooked, raw, decoction, maceration
<i>Mangifera indica</i>	Anacardiaceae	Andôk ntane	Fe, Ec	Hypertension, toothache, fevers, diabetes	Raw, decoction, maceration
<i>Persea americana</i>	Lauraceae	Afiè	Fe, Fr	Stomach ache, hypertension, diabetes, diarrhea	Raw, decoction, maceration
<i>Psidium guajava</i>	Myrtaceae	Goyave	Fe	Hypertension, fever, diarrhoea, scabies, abscess, rheumatism	Raw, decoction, maceration
<i>Terminalia catappa</i>	Combretaceae		Fe, Fr	Diabetes, hypertension, headache	Raw, decoction, maceration
<i>Theobroma cacao</i>	Malvaceae	Kekè	Fr, Ec, Fe	Hypertension, fever, toothache	Decoction, maceration, raw
<i>Vernonia calvaona</i>	Asteraceae	Zome ayo'o	Fe, T	Headaches, hypertension, diabetes, fever, diarrhoea, rheumatism	Decoction, maceration, infusion

Fe : leaves ; Fr : fruit ; T : stem ; E : bark ; R : root ; Gr : seed

Uses of the ten (10) plants in traditional medicine

The populations use these different plants for the treatment of several diseases. Table 1 presents the different plants listed and the diseases they treat.

In general, these plants are used in traditional medicine for the treatment of pathologies such as hypertension, diabetes, fevers, coughs, flu, stomachaches, toothaches and rheumatism.

However, *Acalypha wilkesiana*, *Annona muricata* and *Terminalia catappa* are the plants most frequently used in the treatment of hypertension (fig. 3).

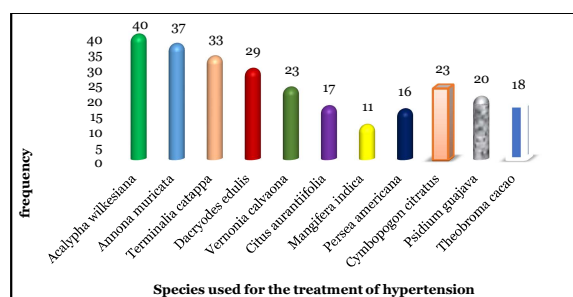


Fig. 3. Frequency of use of listed species for the treatment of hypertension.

Different pathologies treated

Fig. 4 presents the different pathologies treated by the species *A. wilkesiana* during the survey. These include fever, abscesses and scabies, diarrhea, headaches, diabetes and hypertension.

The analysis of Fig. 4 shows that *A. wilkesiana* is mainly and frequently used for the treatment of hypertension (48%) but also for acute headaches (24%) and others (abscess, diarrhea, scabies or 17%) and diabetes (7%).

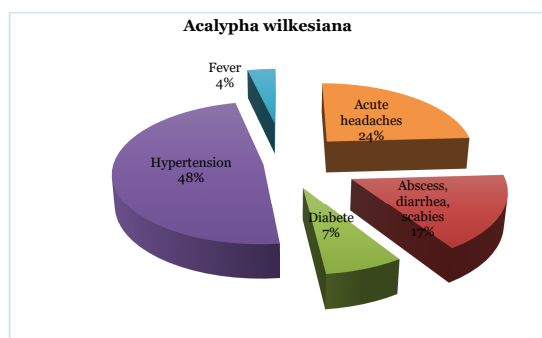


Fig. 4. Pathologies treated by *Acalypha wilkesiana*.

Different parts used of *Acalypha wilkesiana* in the treatment of hypertension

Fig. 5 presents the organs used by the populations for the species *A. wilkesiana* in the treatment of hypertension, for this two organs are frequently used, namely: the leaves (93%) and the roots (7%).

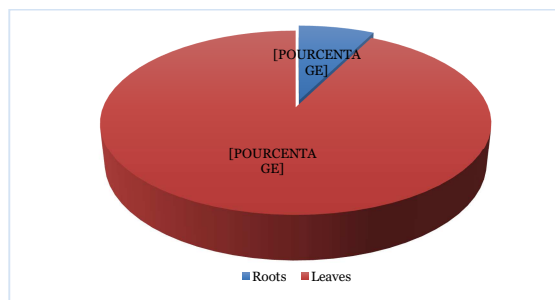


Fig. 5. Organs used for the treatment of hypertension.

Modes of preparations of *Acalypha wilkesiana* for hypertension

Following the survey, three types of preparations stand out in the treatment of hypertension. Indeed, fig. 6 shows the different types of preparation, namely: infusion, decoction and maceration. It appears that *A. wilkesiana* is used more in decoction (54%), followed by maceration (40%).

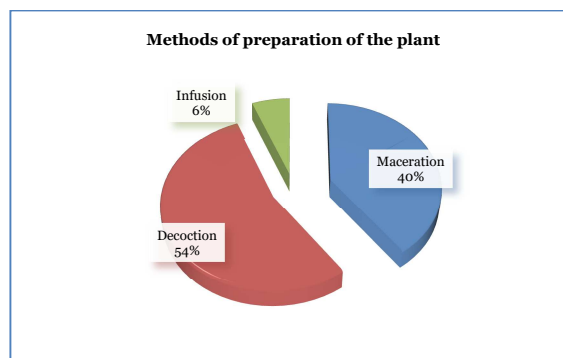


Fig. 6. Ways of preparing remedies.

Discussion

This work is part of the search for antihypertensive plants, in particular *Acalypha wilkesiana*, in order to provide a scientific basis through an ethnobotanical survey.

The results of the survey showed that of the 50 people questioned, men are more represented compared to women, i.e. 84% and 16% respectively (Fig. 2), who's

ages ranged between 43 and 75 years. People aged 50 or over have more knowledge of traditional concepts and practices. The higher gender and age diversity could be explained by the fact that men are more in contact with therapists from an early age, but also by the fact that knowledge is acquired and accumulated over time an older man would have more knowledge than a young one.

The work of Mpondo *et al.* (2012) and Olou *et al.* (2018) showed that older people over 50, especially men, have a better knowledge of medicinal plants. The use of *Acalypha wilkesiana* plants for medicinal purposes is far above other types of uses. This testifies to its importance in medicine for the local populations. This species treats several diseases, namely: scabies, diarrhea, abscess, diabetes and cardiovascular diseases such as high blood pressure (Fig. 4). The treatment of diarrhea, diabetes and cardiovascular diseases have already been described by some authors (Nworgu *et al.*, 2011; Odoh *et al.*, 2014; Aladejimokun *et al.*, 2017), while hypertension has not yet been mentioned.

Our results show that *A. wilkesiana*, a Euphorbiaceae is frequently used for the treatment of hypertension. Indeed, the studies of Olou *et al.* (2018) have shown that this family is recurrent in the treatment of cardiovascular diseases such as arterial hypertension. This could be explained by their chemical composition rich in polyphenols and tannin (Ibrahim *et al.*, 2015).

In the preparation of remedies against these various pathologies, the leaves of *Acalypha wilkesiana* are used, i.e. 93% (Fig. 5). The predominance of one organ over another in the therapeutic field derives from the concentration of secondary metabolites and active principles in this organ (Nsi Akoué, 2017). The leaves are more exploited because they are at the same time central to the photochemical reactions and reservoirs of the organic matter that derives from them. They provide the majority of alkaloids, glycosides and essential oils (Ould El *et al.*, 2003). Our results are similar to those of N'guessan *et al.* (2009) who showed that the leaves are more in demand in traditional medicine.

Similarly Ouattara (2006) corroborates these results highlighting the leaves in the treatment of several cardiovascular pathologies.

Oral administration, which includes the majority of preparations: decoction, maceration and infusion, is more recommended. With regard to *A. wilkesiana*, various methods of preparation are distinguished, but the most representative are decoction (54%) and maceration (40%) and are the most used for the treatment of pathologies in this northern region (Oyem). Our results agree with those of Dibong *et al.* (2015) who showed that decoction and maceration with water was the most used method. Indeed, water is the best solvent for the preparation of ethnotherapy remedies (Dibong *et al.*, 2015).

Our results confirm the relevance of the traditional use of this plant (*A. wilkesiana*) against hypertension in the pharmacopoeia of Gabon, and show the importance of ethnobotanical investigation in the search for new sources of antihypertensive drugs.

Conclusion

The objective of this work was the ethnobotanical survey of *A. wilkesiana* in the treatment of hypertension, conducted among 50 people, which made it possible to show that *A. wilkesiana* is the plant frequently used in the treatment of several diseases, particularly hypertension in the town of Oyem. Overall, three methods of preparation have been listed: decoction, maceration and infusion. The leaves and roots are the main parts used.

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