

Phytotherapy of High Blood Pressure in Three Phytogeographic Regions of Cameroon

Nole Tsabang^{1*}, Clement G Yedjou² and Paul B Tchounwou³

¹Center for Research on Medicinal Plants and Traditional Medicine, Institute of Medical Research and Studies of Medicinal Plants (IMPM), Yaounde, Cameroon

²Cellomics and Toxicogenomics Research Laboratory, NIH-RCMI Center for Environmental Health, Jackson State University, Jackson, USA

³Molecular Toxicology Research Laboratory, NIH-Center for Environmental Health, College of Science, Engineering and Technology, Jackson State University, Jackson, Mississippi, USA

Abstract

Objective: High blood pressure is a public health challenge worldwide. According to World Health Organization, 30% of men and 50% of women 65 to 75 years old are suffering from high blood pressure. The number of hypertensive patients in the world will attain 1.56 billion of people, with 60% increase in prevalence. The incidence of high blood pressure increases with age, but nowadays, is being noticed an increasing incidence in young people. The socio-cultural medicine may provide new solutions in the management of this pathology. Therefore this study was carried out to record and document plants used against high blood pressure in socio-cultural medicine for future drugs discovery worldwide.

Methods: An ethno botanical survey was realized between 2002 and 2016 to identify manifold plants used to fight against high blood pressure. This survey was carried out in three phytogeographic regions of Cameroon. Amongst people living in those regions, 1131 randomly screened interviewees distributed in 58 socio-cultural groups were involved in this study.

Results: This survey reveals that about 70% of interviewees don't know high blood pressure which is a symptomless disease. A total of 28 species of plants were recorded. These plants belong to 25 genera and 24 families. They were used to prepare 28 herbal remedies for the treatment of high blood pressure. In the morphological point of view about 10/28 (36%) plants are herbs; 9/28 (32%) plants are trees and 9/28 (32%) plants are shrubs. Only 3/28 plants (11%) used including *Allium sativum*, *Aloe barteri* and *Aloe buttneri* are cultivated. This means that the plants used in this study don't usually have some form of protection through cultivation which is encouraging in terms of their conservation.

Conclusion: The uncontrolled use of a hypotensive plants can provoke a fatal hypotension in hypertensive patients. Therefore the use of hypotensive plants needs to be controlled by physician or by a patient verification using a blood pressure monitor. Recorded species which will slow the high blood pressure will be used for the preparation of phytodrugs.

Keywords: Cameroon; Anti-hypertensive plants; Phytotherapy; Phytogeographic areas

Introduction

High blood pressure is a multifactor disease, provoked by the association of the genetic predisposition and certain phenotypes like the sensitivity of the arterial blood pressure with sodium concentration, hypocalcaemia and a strong influence of the environment, according to the W.H.O. High blood pressure is manifested when the blood pressure values, measured many times in the occasion of at least two different consultations in four months are superior or equal to 140 mmHg for systolic and superior or equal to 90 mmHg for diastolic. These parameters used to diagnose high blood pressure in occidental medicine are unknown in socio-cultural medicine. Traditional healers, mostly from the hinterland will indirectly control this disease by treating rather their observed and recognized symptoms and/or complications including nose bleeding, filling of the flies before the eyes, dizziness, insomnia, muscular and sexual weakness, edema, etc. The cost of the monthly treatment of non-complicated high blood pressure is 92.24€ per patient. The diet increases the financial charges of patients. Certain combinations of anti-hypertension's treatments, composed from pharmaceutical products and their cost such as Hexen 50 (21.13€), Lodoz (15.88€) are rare in rural zones or expensive for patients. Then the difficulties to get drugs can permit the appearance of redoubtable complications including left ventricular hypertrophy, occlusion of vessels in the heart (infarct) and in the brain (cerebral softness), strokes and kidney failure.

High blood pressure constitutes a public health problem in the World [1]. It is a chronic disorder much frequent in Cameroon [2]. In fact the prevalence of high blood pressure adjusted to the age is 16.6% and 12.6% in men and women respectively in urban population [2]. The victims, with number always in increase constitute a charge for families in Cameroon. They are condemned to dead, seeing their restriction of access to pharmaceutical drugs. But the populations, mostly of hinterland, distant away of urban areas which are well furnished in pharmaceutical products, have developed a wonderful experience on the uses of medicinal and alimentary plants. Occidental medicine has developed hypertensive drugs, but the progressive deterioration of the patients of blood pressure control by these drugs and the poverty in the

***Corresponding author:** Nole Tsabang, Center for Research on Medicinal Plants and Traditional Medicine, Institute of Medical Research and Studies of Medicinal Plants (IMPM), Yaounde, Cameroon, Tel: (237)77461631, (237)98301195; E-mail: tsabang2001@yahoo.fr, tsabang@hotmail.com

Received November 03, 2016; **Accepted** January 27, 2017; **Published** January 30, 2017

Citation: Tsabang N, Yedjou CG, Tchounwou PB (2017) Phytotherapy of High Blood Pressure in Three Phytogeographic Regions of Cameroon. Pharm Anal Acta 7: 530. doi: 10.4172/2153-2435.1000530

Copyright: © 2017 Tsabang N, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

developing countries make the traditional medicine to be an alternative for the treatment [3]. Therefore this study was carrying out to record and document plants used in socio-cultural medicine for future drugs discovery worldwide.

Methodology

In order to collect manifold plants that can treat high blood pressure, an ethnobotanical survey was carried out in various socio-cultural groups [4] living in three big phytogeographic regions including coastal rain forests; continental rain forests and Sudano-Zambeian Region and Guinian savannahs zones (4:5). The ethnobotanical survey was carried out in these units, with interviewees selected in different tribes.

A total of 58 socio-cultural groups (composed by 16 in coastal rain forests phytogeographic region, 14 in continental rain forests phytogeographic region and 23 in Guinian and Sudano-Zambeian savannahs region) were explored during the interview. The fieldwork was conducted using semi structural questionnaire with different sections of plant species identification, ethnopharmacological detailed preparations, description of recipes, ethnomedical modes of administration, posology, duration of treatment, undesirable or secondary effects and toxic effects. The confirmation of the potential efficacy of some recorded antihypertensive plants was done using previous pharmacological studies. The plants and plant names (Scientific, English, and Vernacular), plant parts used, type of hypertension treated and photochemical principles of the plants [5,6] and frequency of plants were recorded. The identification of samples plant species has been confirmed in National Herbarium of Cameroon and samples plants recorded were conserved in the Institute of Medical Research and Studies of Medicinal Plants.

Results

- All the recipes recorded are described in detail at the end in Table 1. The statistical analysis realized from this table revealed the following results:
- A total of 28 species of plants were recorded. These plants belong to 25 genera and 24 families. They were used to prepare 28 herbal remedies for the treatment of high blood pressure.
- In the morphological point of view about 10/28 (36%) plants are herbs; 9/28 (32%) plants are trees and 9/28 plants are (32%). Only 3/28 plants (11%) used including *Allium sativum*, *Aloe barteri* and *Aloe buttneri* are cultivated. This means that the plants used in this study don't have usually some form of protection through cultivation which is encouraging in terms of their conservation. Fifty-five percent (55%) of the herbal remedies are prepared with plants belonging to the families of Apocynaceae, Caesalpiniaceae, Liliaceae, Mimosaceae, Rubiaceae, Rutaceae and Fabaceae. The

most frequent cited genera are *Zanthoxylum*, *Musanga*, *Azelaia*, *Albizia*, *Voacanga* and *Hallea*.

- For the parts of plants used the leaves 18/42 (43%) were the most important plant parts used in the preparation of the herbal remedies, following by the stem bark 14/42 (33%).
- It is important to note that harvesting of leaves for treatment of high blood pressure will be less detrimental to populations of plants compared to roots, stem materials and whole plants, especially in this case where there is no sustainable harvesting strategy. The leaves of the plants should be used as an alternative if their chemical composition is not very different from that of the roots, stem materials or the whole plant.
- The most used plants are *Moringa oleifera* (280 repetitions), following by *Aloe buettneri* and *Aloe barteri* (208 repetitions each).
- Most of the herbal remedies were prepared by boiling in water or decoction 19/28 (68%), following by infusion 5/28 (18%), maceration 3/28 (11%) and consumption 1/28 (3%). This situation is not different from what has been reported in the treatment of malaria in Ghana [7-8] and in Budiope County of Uganda [9] and Msambweni District of Kenya [10]. Boiling of plant materials was also the main method of ethnopharmacological preparation of herbal remedies for the treatment of high blood pressure such as in Yaounde and its surroundings areas in the case of diabetes treatment [11].
- All the herbal remedies used in this study were administered orally. Dosage prescriptions were adapted approximately to a glassful (equivalent to 250 mL) or half a glassful three times per day was respectively prescribed for adults and children. Treatment was supposed to be continued until recovery. The problems associated with dosage prescription in the use of herbal remedies for the treatment of malaria has been highlighted by a number of authors [7,9]. In this study we have try to resolve the problem by quantifying the amount of plants material used and the dosage.
- Traditional healers reported that their herbal remedies had no side effects. This is not verified because traditional healers do not follow up for the side effects of their remedies. Similar observations have been made in Ghana [8].
- There is no significant difference between trees, herbs and shrubs recorded.

Discussion

Knowledge about high blood pressure and treatment practices

Traditional healers interviewed, seemed to know high blood pressure through observation of some signs, symptoms and complications. Those included feeling of the flies before eyes (90%), sexual weakness (70%), muscular weakness (90%), insomnia (95%), dizziness (90%), edema (64%), hemiplegic paralysis (12%), angina (10%), nosebleeds or nose hemorrhage (21%), severe headaches (45%), severe anxiety (30%) and shortness of breath (8%). The percentage number of interviewees is indicated in brackets. The mode of transmission of the disease wasn't well known. Some interviewees know that high blood pressure is family disease. All the traditional healers interviewed used herbal remedies for the treatment of high blood pressure. The reasons for using herbal remedies were their availability and their cost-effective. It is important to note that herbal remedies were used for only curative purposes. So in

Number	Usual antihypertensive plants				Plants with previous hypotensive effect
	R1	R2	R3	Total	
	8	7	13	28	18
% of usual antihypertensive plants with established hypotensive effects: 64%					

Table 1: Ethnopharmacological description of all herbal remedies according to phytogeographic regions The Table 1 presents the distribution of herbal remedies with precision on the morphology of the plants used, parts used, ethnopharmacological methods of preparation, administration route, dosages, frequencies of use, different types of herbal remedies recorded and duration of treatments. R1: Coastal rain forests region; R2: Continental rain forests region; R3: Guinean and Sudano-Zambeian Region and savannahs region.

the management of high blood pressure herbal remedies were not used for prevention in tribes visited.

Comparison of ethnopharmacological uses with previous pharmacological studies (antihypertensive plant extracts and physiochemical constituent's activities)

The literature search showed that many antihypertensive plants were used to treat malaria in other parts of Africa. However, 12% of plants are documented for the treatment of high blood pressure in the literature search viewed [12-28]. The more important of these plants are *Allium sativum*, *Hallea inermis* and *Hallea stipulosa*. The phytochemical constituents of these plants have also been isolated. The phytochemical composition of medicinal plants is rarely constant, which may be an advantage over chemically homogeneous drugs controlling chronic disease such as high blood pressure. Nevertheless, knowledge of the pharmacological, phytochemical and toxicological properties of the herbal remedies used needs to be investigated in order to ensure the effective treatment for high blood pressure as well as its safety for people and the need to presents the active compounds in those plants as well as their antihypertensive activities (Table 1).

Secondary high blood pressure

The presences of one or several antihypertensive substances in plants of Table 1 which can treat the secondary high blood pressure (Table 1) confirm the use of these plants in socio-cultural medicine against high blood pressure.

Essential high pressure

Phyllanthus niruri is the only plant which can treat the essential high blood pressure (Table 1).

Distribution of usual antihypertensive plants

Usual antihypertensive plants were recorded with the aid from 30% traditional healers and other informants who know high blood pressure. Table 2 presents their distribution.

Conclusion

At the end of this study we realize that plants which can play an important role in the treatment of high blood pressure are effectively different between the three phytoecographic regions. According to this reason manifold plants and recipes were identified. The determination of the type of high blood pressure treated was necessary to optimize the effectiveness of plants used. The development of complications and the no mastering of the multiple causes of this affection make more difficult the action of herbal remedies. The traditional healers should imperatively oblige patients to confirm their high blood pressure state by taking at least two times their blood pressure in two different consultations in four weeks. This practice can help for an earlier diagnostic of patients. The knowledge of bioactive plants can favor a better management of patients and the improvement of the quality of socio-sanitary cares administered to patients. Amongst antihypertensive plants recorded *Allium sativum* (garlic) is able to reduce significantly the rate of cholesterol in the blood. This species is

S/ NO	Family, scientific and English names	Vernacular names	Plant part (s) used	Medicinal Plants	Principles and activités	Methods of preparation	Route of administration	Posology, duration of treatment and secondary effects	FR
Coastal rain forests region									
1	Menispermaceae Jateorhiza macrantha Herb	Mbi (Bakola), Kolkoio (Bakoun),	Young leaves	Secondary high blood pressure	Columbamine/ hypotensive [14]	Decoction of 100 g of young leaves in 3 L of water, for 25 min.	Oral	Take 250 mL of decoction three times a day, for a week.	5
2	Caesalpiniaceae Afzelia bipindensis English: Doussie Doussie Rouge Tree	Common name Apa Mbanga (Douala), Ndemba (Bassa), Timi (Baka), Njoc (Ewondo);	Fresh leaves			Decoction of 200 g of fresh leaves in 3 L of water for 15 mn	Oral	Take 250 mL of decoction 3 times daily, for a week.	6
3	Apocynaceae Voacanga thouarsii English name: Wild frangipani Small tree	Eyolla njongi (Douala)	Fresh bark			Decoction of 100 g of fresh bark, in 3 L of water, for 30 min.	Oral	Drink 250 mL of decoction, 3 times a day, for 5 days.	18
4	Urticaceae Laportea ovalifolia English name: Fowl nettle Hawai' i woody nettle Herb	Tololi, Itoil (Oroko), Sasa kola (Bassa), Sasangulu (Pygmies), Kinhiemou (Widekam), Kinshei (Banso), Sisie (Bamiéléke), Dandy (Bagweri)	Aerial parts		saponins, tannins, and phenolic compounds for aqueous extract and sugars, saponins, phenolic compounds, Sterol, triterpens lipids, alkaloids, and Glycosides for methanol/methylene chloride extract [15].	Maceration of 100 g of aerial parts in 2 L of water.	Oral	Drink 250 mL of macerate 2 times a day, for a week	21
5	Amperidaceae Cissus quadrangularis English names: asthisamharaka; Asthisonhara, Chadhuri, Chaudhari Herb	Epripri (Wum), Njol (Bassa) Ndieh gap (Bamoun), Ntang-dikun (kom), Ndig (Kaka); alvarahala, Gadai, Chimbaral (Fufuldé)	Leafy stem	Secondary high blood pressure	Vitamin c/ Antioxidant [14,19]	Maceration of 200 g of leafy stems finely cut, in 2 L of water.	Oral	Drink 250 mL, 3 times a day, for 3 days.	7

6	Rutaceae <i>Zanthoxylum heitzii</i> English names: African satinwood, African stainwood, white African mahogany Tree	Bolonais (Baka), Bongo (Ewondo), Oblong (Fang), Djouba (Badjoue)	Stem bark			Decoction of 200 g of stem bark, for 15 min, in 2 L of water.	Oral	Drink 250 mL of decoction, 2 times daily, for 5 days.	3
7	Caesalpiniaceae <i>Azelia pachyloba</i> English names: African oak; African mahogany Tree	common names "pod mahogany Edison fun (Boulou), Njié-bondondé (Baka)	Bark			Decoction of 200 g of bark in 3 L of water, for 15 min.	Oral	Drink 200 mL of decoction times daily, for a week.	6
8	Asteraceae <i>Bidens pilosa</i> English names: beggar tick; bur marigold; cobbler's pegs; duppy needles; farmer's friend; needle grass Herb	Tetseneck, Maleliet (Yemba-Menoua), Fortah (Lamsou); yié, Touwan (Bamoun), Enjohn missi (Kaka), Fortar (Nso), Fonta (Banso), Pihanhua (Bana Haut-Nkam), Fasomont-Combou (Bakossi), Njimjim (Bassa); Ateurri (Boulou), Biakoua (Féfé-Haut-Nkam), Ngathabre (Fufulde), Kegis (Oku), Foseénu (Nkom) Ntchaquegné (Medumba-Ndé), Mfegzoa, Avè-Bikon (Ewondo), Lilia Mnioc (Batié-Haut-Plateau); Kio Mnye (Baham-Haut-Plateau), Ayebana, Fogue Fogue, Pougoudou (Yambassa)	Fresh leaves Dry leaves	Secondary high blood pressure	Phytosterin-β/ Hypotensive [16,23]	Decoction of 200 g of fresh leaves or 80 g of dry leaves in 4 L of water, for 20 min.	Oral	Drink 250 mL of decoction, 4 times a day, for a week days	8
Continental rain forests region									
1	Phyllanthaceae <i>Phyllanthus niruri</i> English names: Tonebreaker, Seed-Under-Leaf Herb		Aerial part	Essential high blood pressure	Inhibitor of conversion enzyme (ICE) functioning with three substances: ellagic acid, gallic acid and geraniin./hypotensive [17].	Decoction of 100 g of aerial part in 2 L of water, for 15 min	Oral	Drink 250 mL of decoction, 2 times daily, for a week	10
2	Liliaceae <i>Aloe buttneri</i> Herb		Bulb			Infuse 200 g of bulb of onion, cut into small pieces, in 2 L of water, for 24 h.	Oral	Drink 250 mL 'infusion, 4 times a day, for a week.	208
3	<i>Aloe barteri</i> Herb								
4	Fabaceae <i>Mucuna pruriens</i> English common name: Cowhage Herb		Leaves	Secondary high blood pressure	Indolic hydrosoluble bases/ Hypocholesterolemiant [17,22]	Decoction of 100 g of young leafy stems, in 2 L of water, for 15 min.	Oral	Drink 250 mL of decoction, 3 times daily, for 7 days.	4
5	Apocynaceae <i>Voacanga thouarsii</i> English name: Wild Frangipani	Etó (Eton)	Bark	Secondary high blood pressure	Voacamine, Vobtusine, Voacagine; tabersonine, Voacordine [12,13,21,24]	Boil 200 g of bark in 4 L of water, for 20 min.	Oral	Drink 250 mL of decoction, 3 times a day, for a week.	4
6	Rutaceae <i>Zanthoxylum macrophylla</i> English African satinwood Tree	Nleh-rohng (Bafia), Elongo (New-Balimba)	Fresh Leaves			Infusion of 50 g of fresh leaves in 1 L of water, for 30 min.	Oral	Drink 250 mL of infusion 4 times a day, for a week.	8
7	Rutaceae <i>Vepris louisii</i>	Tanda (Baka)	Bark			Decoction of 250 g of root bark, in 6 L of water, for 25 min.	Oral	Drink 250 mL of decoction, 3 times daily, for 5 days.	8
Guinean and Sudano-Zambeian savannahs region									
1	Rubiaceae <i>Hallea inermis</i> English name: false abura Tree	Koli, Harhandelo (Fululdé), Har (Kotoko), Kabé, Diaye, Diéya (Haoussa)	Bark	Secondary high blood pressure	Rotundifoline, rhyngophylline/ Hypotensive [12,20]	Decoction of 200 g of stem bark in 3 L of water, for 20 min.	Oral	Drink 250 mL of decoction, 3 times a day, for a week.	3
2	Rubiaceae <i>Hallea stipulosa</i> English names: poplar, Trade abura; bahia Tree	Adjobojan, Afopzam (Boulou), Ohambé (Bassa), Elolom (Ewondo), Etok akpa (Ejagham, Balong and Oroko)	Stem bark			Decoction of 200 g of stem bark in 4 L of water, for 30 mn.			Oral

3	Liliaceae Allium sativum English name: Garlic Herb	Albacce, Albasarre (Fufuldé)	Stem Bulb	Secondary high blood pressure	Organic sulfuric/ Peripheral vasodilatation [14] Calcium channel inhibitor	Decoction of 100 g of stem and 100 g of cut bulb in 4 L of water, for 15 min.	Oral	Drink 250 mL of decoction, 2 times daily, for a week.	8
4	Rutaceae Vepris heterophylla English name: Candlewood	Kinkéliba, Kinkéliba de Kita, Jamba, boutoumbali (Arabes Choa)	Fresh leaves			Boil 100 g of fresh leaves in 3 L of water, in 30 mn.	Oral	Drink 250 mL of decoction, 3 times a day.	2
5	Mimosaceae Albizia coriaria English names: worm-bark false-thorn, worm-cure albizia, cherry-blossom Tree	Sanda, Tolo (Baya), Pâssour (Bamoun)	Stem bark			Maintain in ebullition 100 g of stem bark in 2 L of water, for 25 nm.	Oral	Drink 250 mL of decoction, 4 times a day.	6
6	Caesalpiniaceae Senna occidentalis English name: Mamatasba herb	(Fufuldé); Sangatasha (Eton); Sanga (Ewondo), Ngasila (Baya) common name: Coffee weed	leaves	Secondary high blood pressure	Leaf extract/ Reducing blood pressure by inhibiting Ca ²⁺ influx through receptor-operated channel and voltage- sensitive channel [20], relaxant effect on the aortic rings [20].	1-Decoction of a teaspoon of powder of leaves, in 200 mL of water, for 10 min. 2-consumption of young	Oral	Take a teaspoon in the morning, mi-day and evening, for 7 days. 2-Eat the young leaves like vegetable.	7
7	Caesalpiniaceae Afzelia africana English names: African oak; African mahogany Tree	Guéla (Baya); Ekan (Eton), Boking (Douala)	Bark			Maceration of 300 g of bark in 6 L.	Oral	Drink 250 mL of macerate, 4 times a day, for 7 days.	4
8	Ulmaceae Celtis integrifolia English names: nettle tree, African nettle tree: African false elm; hackberry Tree	Ganki, Jukigenki (Fufuldé)	Bark			Decoction in 4 L of water, 250 g of root bark, in 30 min.	Oral	Drink 250 mL of decoction, 4 times daily, for a week.	4
9	Rhamnaceae Ziziphus mauritiana English Names: Indian Jujube, ber, Chinee apple, jujube, Indian plum. Kannada Shurb	Fi (Tokoto), Magaria, Mgariar, Koura (Haoussa), Déré (Toupour), Embaé (Moundang), Verkasa (Mafa), Dovašené (Kapsiki), Gulumjaabi (Fufuldé)	Fruit	Secondary high blood pressure	Vitamin c/ Antioxidant [17,19,24]	Eating of fruits	Oral	Eat 3 fruits per day, for a week. Root is toxic in strong dosage	6
10	Rutaceae Zanthoxylum zanthoxyloides, English names: prickly shrub or low-branching shrubby Tree	Gah-tchou (Bamiléké)	Stem bark			Decoction of 300 g of stem bark, in 2 L of water, for 20 min.	Oral	Drink 250 mL of decoction, 3 times a day, a week.	6
11	Combretaceae Guiera senegalensis English name: sabara Shurb	Gelloki, Guélloki (Fufuldé), Sabara, Schabala (Haoussa), Abes, Rabbes, Ribes (Arabes-Choa), Kose (Kotoko), Waburobero (Fali), Fullafull (Massa), Ha'fay (Moundang), Fur, furi (Toupour)	Leaves			Infusion of 100 g of leaves in 3 L of water, for at least 2 h.	Oral	Drink 250 mL of infusion, 3 times a day, for 5 days.	6
12	Fabaceae Pterocarpus santalioides Shurb	Bolota (Baya), Mâdobihiha (Haoussa)	Stem bark		bioactive substances (flavonoids, tannins, saponins, phenols Polyphenol)[28]	Decoction of 250 g of stem bark, in 5 L of water, for 40 mn,	Oral	Drink 250 mL of decoction, 3 times a day, for 5 days.	4
13	Balanitaceae Balanites aegyptiaca Common. English names: soapberry tree; thorn tree; desert date Shurb	Adoua (Fulbés)	Fruits	Secondary high blood pressure	Fruits/ Hypocholesterolemiat Vasodilatator [17]	Eating	Oral	Eat three fruits a day, for two weeks	10
Common in the three phytogeographic regions									
1	Annonaceae Annona muricata English names: prickly custard apple, soursop Shurb	Common name: Prickly Custard apple	Leaves	Secondary high blood pressure	Leaf extract/ Decreasing the peripheral vascular resistance [16]	Infusion of 100 g of leaves in 3 L of water, for at least 2 h.	Oral	Drink 250 mL of infusion, 3 times a day, for 5 days.	13
2	Moringaceae Moringa oleifera English name: Drumstick plant Shurb	Common name: Murungai	Leaves		Thiocarbamate and isothiocyanate fractions/ Fall in systolic, diastolic, and mean blood pressure in a dose-dependent manner [22]	Boil 50 g of leaves in 1 L of water, for 15 mn.	Oral	Drink 250 mL of decoction, 3 times per day, for 3 days.	280

3	Cecropiaceae Musanga cecropiodes English names: African corkwood tree or umbrella tree Tree	Common name: Umbrella tree, Cork Wood	Stem bark	Secondary high blood pressure	The latex and the leaves aqueous extract Vasorelaxant agent The water extract of the stem bark/ reduction in mean arterial blood pressure, which fell by 4.51 ± 0.5 mmHg at the dose of 10 mg/kg and 65.23 ± 6.28 mmHg at 40 mg/kg dose [26,27].	Decoction of 1.5 g of stem bark per kg of body weight in 3 L of water for 15 min.	Oral	Take 250 mL of decoction, 2 times a day, for 5 days. The long time use and the strong doses can provoke gastric ulcers (12).	18
	Number of species by morphology Total: 28 (100%) Trees: 9 (32%) Herb: 10 (36%) Shurb: 9 (32%)		Parts of the plants used Total: 42 (100%) Leaves: 18 (43%) Bark: 14 (33%) Aerial part: 5 (12%) Fruit: 2 (5%) Bulb: 2 (5%) Stem: 1 (2%)			Number of times that each modes of preparation appeared Total: 28 (100%) Decoction: 19 (68%) Maceration: 3 (11%) Infusion: 5 (18%) Consumption: 1 (3%)	Oral: 28 (100%)	Number of times that an ethno pharmacological preparation time appeared: Total: 19 (100%) 15 mn: 8 (42%) 20 mn: 4 (21%) 25 mn: 2 (11%) 30 mn: 4 (21%) 2 h: 1 (5%) Number of times that a duration of treatment appeared: Total: 29 (100%) 1 day: 1 (3%) 3 days: 2 (2,7%) 5 days: 7 (24%)	Number of times that a frequency appeared: Total: 27 (100%) 280: 1 (4%) 208: 1 (4%) 6: 6 (23%) 4: 5 (19%) 8: 2 (7%) 7:3 (11%) 18: 2 (7%) 10: 2 (7%) 3:2 (7%) 13: 1 (4%) 5: 1 (4%) 21: 1 (4%)

Table 2: Ethno pharmacological methods of preparation and administration of herbal remedies.

an important antihypertensive plant due to its hypotensive actions, thus can be strongly recommended to traditional healers. The uncontrolled use of a hypotensive plant can provoke a fatal low blood pressure in hypertensive patients. Therefore the use of hypotensive plants needs to be controlled by physician or by a personal verification using a blood pressure monitor.

Acknowledgment

Thanks are expressed to local therapists, householders and other interviewees met in the field which have collaborated to the realization of this work, to Bioresources Development and Conservation Programme-Cameroon for the training courses that we receive on field ethnobiology and to Professor Koueke Paul, retired Professor of Faculty of Medicine and Biomedical Sciences, University of Yaoundé 1 for precious supervision of this work.

References

- (2000) A.F.D (Association française des Diabétiques). Une épidémie est annoncée. *Equilibre* 214: 8-10.
- Mbanya JCN, Minkoulou EM, Salah JN, Balkau B (1998) The Prevalence of hypertension in rural and urban Cameroon. *Int J Epidemiol* 27: 181-185.
- Grimaldi A, Hartemann-Heurtier A (1996) *Diabète et Génétique*. Collection 'Diabète' Edité par Phases, Paris, p: 48.
- Tsabang N, Ngah N, Estella FT, Agbor GA (2016) Herbal Medicine and Treatment of Diabetes in Africa: Case Study in Cameroon. *Diabetes Case Rep* 1: 112.
- Tsabang N (2008) Etude ethnobotanique des plantes à vertus antidiabétiques et/ou antihypertensive au Cameroun. Université de Yaoundé I, p: 319.
- Saganuwan, Saganuwan A (2010) Some medicinal plants of Arabian Pennisul. *J Med Plant Res* 4: 766-788.
- Asase A, OtengYeboah AA, Odamtten GT, Simmonds MSJ (2005) Ethnobotanical study of some Ghanaian antimalarial plants. *J Ethnopharmacol* 99: 273-279.
- Asase A, Oppong-Mensah G (2009) Traditional antimalarial phytotherapy remedies in herbal markets in southern Ghana. *J Ethnopharmacol* 126: 492-499.
- Tabuti JRS (2008) Herbal medicines used in the treatment of malaria in Budiope County, Uganda. *J Ethnopharmacol* 116: 33-42.
- Nguta JM, Mbaria JM, Gakuya DW, Gathumbi PK (2010) Antimalarial herbal remedies of Msambweni, Kenya. *J Ethnopharmacol* 128: 424-432.
- Tsabang N, Nkongmeneck BA, Zapfack L, Nzooh Dongmo Z, Nguenang GM, et al. (2001) Inventaire des plantes à vertus antidiabétiques dans la région de Yaoundé au Cameroun. *Revue Méd Pharm Afr Paris* 15: 87-94.
- Paris RR, Moyse H (1971) *Précis de matières médicales: collection de précis de pharmacie, Pharmacognosie spéciale, dicotylédone (suite) gamopétales*. Masson et Cie. Editeurs Paris Vie. Tome 3: 509.
- Bep OB (1986) *Medicinal plants in Tropical West-Africa*. Cambridge University Press. Cambridge, NY, USA, p: 375.
- CIPCRE (2000) *Connaissez-vous les plantes Médicinales ? Rapport de recherche*. Cercle International pour la Promotion de la création (CIPCRE). ONG, Bafoussam.
- Claudia MNE, Fomekong, Inès DG, Dagobert T, Dongo E, et al. (2007) Effect of Aqueous and Methanol/Methylene-Chloride Extracts of *Laportea ovalifolia* (Urticaceae) on Blood Glucose Level in Rats. *Pharmacologyonline* 3: 105-118.
- Hasrat JA, Pieters L, Vlietinck AJ (2004) Medicinal plants in Suriname: hypotensive effect of *Gossypium barbadense*. *J Pharm Pharmacol* 56: 381-387.
- Poussel JL (1989) *Plantes Médicinales Africaines. Utilisation pratique*. TOME I. Ellipses, Edition Marketing, Paris, p: 170.
- Volak J, Etodola J (1997) *Plantes médicinales*. Edition 'La nature à livre ouvert (Elogan)'. Librairie Grund, Paris, p: 90.
- Rah M (1997) *Pourquoi les animaux n'ont pas d'infarctus hommes si? La découverte qui va mener à l'éradication des maladies cardiaques. Le plus important programme de santé cardiovasculaire*. MR publishing, San Francisco, CA 94102, USA, p: 270.
- Ajagbonna OP, Mojiminiyi FBO, Sofola OA (2001) Relaxant effects of the aqueous leaf extract of *Cassia occidentalis* on rat aortic rings. *Afr J Biomed Res* 4: 127-129.
- Bouquet A, Debray M (1974) *Travaux et Documents de l'office de la Recherche*

- Scientifique d'Outre-Mer (ORSTOM), plantes médicinales de la Côte-d'Ivoire, Paris, p: 220.
22. Faizi S, Siddiqui BS, Saleem R, Aftab K, Shaheen F, et al. (1998) Hypotensive constituents from the pods of *Moringa oleifera*. *Planta Med* 64: 225-228.
23. Tsabang N, Nkongmeneck BA, Nguenang GM, Fongnzossie E, Koueke P, et al. (2005) Médecine traditionnelle. Une méthode d'identification des diabétiques et des plantes pouvant améliorer leur état de santé. *Revue Cameroon Ethnobotanique Network* 1: 53-62.
24. Kerharo J, Adam G (1974) La pharmacopée Sénégalaise traditionnelle. Plantes médicinales et toxiques. Editions Vigot frère, Paris, p: 1011.
25. Dimo T, Nguenefack BT, Dongo E, Rakotonirina A, Rakotonirina SV (1999) Effets hypotensifs de l'extrait au méthanol de *Bidens pilosa* L. chez les rats hypertendus. *Pharmacologie*, pp: 322-329.
26. Kamanyi A, Bopelet M, Aloamaka CP, Obiefuna PC, Ebeigbe AB (1991) Endothelium-dependent rat aortic relaxation to the aqueous leaf extract of *Musanga cecropioides*. *J Ethnopharmacol* 34: 283-286.
27. Owolabi OJ, Ayinde BA, Nworgu ZA, Ogbonna OO (2010) Antidiarrheal evaluation of the ethanol extract of *Musanga cecropioides* stem bark. *Met Find Exp Clin Pharmacol* 32: 407-411.
28. Eze SO, Cornelius C, Okereke H (2012) Phytochemical and Antimicrobial Analysis of the Stem Bark of *Pterocarpus santalinoides*, (Nturu Ukpa). *Asian J Nat Appl Sci* 1: 26-32.