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ETHNOBOTANICAL SURVEY OF MEDICINAL PLANTS USED IN THE MANAGEMENT OF HYPERTENSION IN THE MARITIME REGION OF TOGO

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Abstract

Background: Hypertension is one of the most common chronic diseases in modern societies and there is evidence that its incidence and severity are increasing. This survey was conducted to investigate the plants used by the Togolese traditional healers to treat the disease.
Method: From January to June 2016, an ethnobotanical survey was conducted using a semi-structured questionnaire with traditional healers (TH) in the southern region of Togo. The importance of the plants was assessed by the calculation of the use value (UV).
Results: In Total, 128 TH male and female were interviewed and 116 plants species belonging to 46 families were identified as treating hypertension. The most represented families were: Fabaceae with 16 species followed by *Euphorbiaceae* and *Rutaceae* contributing with 8 and 6 species respectively. Based on the calculated use values the most important species were *Byrsocarpus coccineus* Schum. Et thonn. (UV = 0.47)*; Crateva religiosa* G.Forst. (UV = 0.47), *Boerhavia diffusa* Engelm. &A.Gray L. (UV = 0.47), *Xylopia aethiopica A*. Rich. (UV = 0.42), *Mangnifera indica* L. (UV = 0.38). The leaves and the roots were the parts of plant predominantly used to prepare the recipes, mainly decoctions administrated by oral route. Clinical manifestations such as dizzy spells, swarming, loss of consciousness, severe headache, severe anxiety and shortness of breath, nosebleed, and fear of heights were used by TH to diagnose the disease.
Conclusion: This study showed initial evidence of the use of plant materials by Togolese TH to treat hypertension. These results constitute a database for pharmacological screenings with the aim of developing new therapies.

Key words: Hypertension, traditional medicine, ethnobotanical survey, medicinal plants, Togo.

Introduction

Nowadays, there is a renewed interest in medicinal plants research because of health problems that remained unsolved (Briskin, 2000; Rafieian-Kopaei, 2011; Atanasov et al., 2015). The main examples are infectious disease such as malaria (Larremore et al., 2015; Rosa et al., 2015) and bacterial infections (Cohen et al., 2015; Le Doare et al., 2015; Oneko et al., 2015).To these diseases are added cancer and metabolic diseases such as diabetes and arterial hypertension whose incidence is increasing (Frohlich, 2001; Sowers et al., 2009). Hypertension is generally a chronic condition and is often associated with few or no symptoms. Symptoms usually occur when blood pressure spikes suddenly and extremely enough to be considered as a medical emergency. Rare symptoms include dizzy spells, headaches, and nosebleeds (Svilaas et al., 2008). Many people may suffer from the disease without knowing it. Uncontrolled high blood pressure, or hypertension, causes damage to arteries. It is also a risk factor for stroke, heart attack, and other cardiovascular problems.

There are a number of treatments for high blood pressure, ranging from lifestyle changes, weight loss, and medication. Many efforts are being made in synthetic chemistry to bring to market new drugs against the disease, but the need for new molecules arises today with acuity. This current situation justifies the new resurgence of interest in medicinal plants, given their potential in this matter (Gali-Muhtasib et al., 2015; Baharvand-Ahmadi and Asadi-

Samani, 2016). In the particular case of hypertension, there is a high prevalence of usage of complementary medicine. Indeed, plants have always contributed largely in the fight against various diseases, considering the number of remedies derived directly or indirectly from plants (Dzib-Guerra et al., 2016; Rouhi-Boroujeni et al., 2016). Consequently, in the recent decades, the medicinal plants used in the management of the disease have attracted the attention of some authors, through the screening for loss level blood pressure activity of plant extracts.

In Africa, it is a question of culture and tradition and it is estimated that over 80% of the population in rural areas have exclusive use of plants for their primary health care needs (Baharvand-Ahmadi et al., 2016). Increasingly, studies related to medicinal plants are conducted by researchers in Africa and some lead to the identification of active principles (Tchacondo et al., 2012; Ilboudo et al., 2013). However, data on the ethnobotany of plants used in the management of Hypertension are scanty. In the particular case of Togo, Karou et al. (2011) conducted a study of the plants used in the treatment of diabetes and hypertension in the central region, one of five regions in the country. Data are missing for the rest of the country. The present study was undertaken to investigate the treatment of Hypertension by traditional healers in the Southern region of Togo.

Materials and Methods

Study area

Togo is a western African country lying between Burkina Faso in the North, Benin in the East, Ghana in the West and the Atlantic Ocean in the South. The country is divided into five economic regions namely Savannah Region, Kara Region, Central Region, Plateau Region, and Maritime Region. The present study was carried out in the Maritime Region (figure 1). It stands between 1°20'-1°50' east and 6°10'- 6°60' north of the equator and bordered to the north, West, East and the South by Plateau Region, Republic of Ghana, Republic of Benin and the Atlantic Ocean respectively. This study area is 6100 km^2 big and occupies approximately 10.78% of the country. The climate is sub-equatorial. The region is inhabited by 1.828.000 people (density of 50 -200 persons/km^2), the main ethnic groups being *Ewe*, *Ouatchi*, *Mina*, *Fon*, *Adja*.

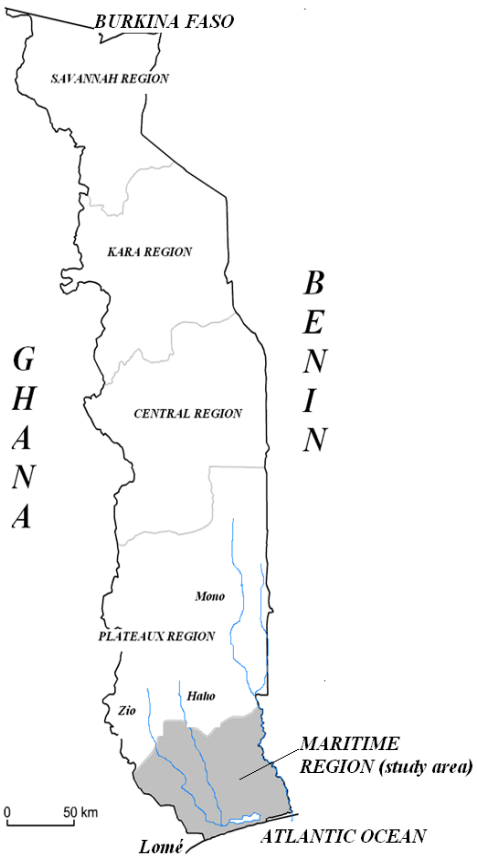

Figure 1: Map of Togo showing the Maritime Region

Data collection

Direct interviews with traditional healers (TH) were conducted between June and August 2016 using a semi-structured questionnaire. Each TH gave a verbal consent certifying his/her agreement with the form issued to explain the importance of the information they would provide prior to interviews. Questions asked were about (i) the TH identity, i.e. name and surname, sex, age, level of education; (ii) the origin of their knowledge; (iii) the status of the TH,

i.e. full-time professional TH or part-time professional TH; (iv) the disease, i.e. name of the disease in the local language; (v) the diagnosis, i.e. main symptoms; and (vi) the remedies, i.e. the number of plants in the remedy, the local names of the plants, the used parts, the mode of preparation, and the administration route.

Plant identification

After interviews, preliminary identification of the plants was done in the field by a botanist. Afterward, herbarium specimens were prepared and pictures were taken to help in the confirmation of the identity of the plants. Plant identities were confirmed by comparison with available voucher specimens in the Herbarium of the Botany Department, University of Lomé, using taxonomic keys of online databases of West African Plants – A photo Guide on the website: http://www.westafricanplants.senckenberg.de/root/index.php. Nomenclature of species was done using the online data base of IPNI website: http://www.ipni.org/ipni/plantnamesearchpage.do.

Statistical analysis

Excel spread sheet was used to make simple calculations and to determine plant frequencies. The use value (UV), a quantitative method that demonstrates the relative importance of species known locally, was calculated according to the following formula (Aburjai et al., 2007; Hudaib et al., 2008):

$UV = \Sigma U/n$

where, UV is the use value of a species; ΣU the total number of citations per species; n the number of informants. The other analyses were performed using PRISM 5.02 program (GraphPad Software, Inc., La Jolla, USA). Since most of the variables did not show a normal distribution, the following tests were chosen: to compare three groups a Kruskal-Wallis-test was performed and, if significant, followed by a Mann-Whitney–U test for a further comparison of the groups. P-values of 0.05 or less were considered significant.

Results

Socio-demographic profile of the traditional healers

One hundred and twenty-eight traditional healers (83 males and 45 females) were interviewed in the present study. Table 1 displays the socio demographic profile of the TH. The TH were divided into five age groups, notably the less than 30 years, 30 to 50, 50 to 70, 70 to 90 and the more than 90 years. According to the recorded data on the TH implicated in the treatment of arterial hypertension in the surveyed region, the 30 years and 70 to 90 years old individuals accounting respectively for 9.38 and 31.25% were less represented compared to either 30-50 years or 50-70 years old people. Only 2 TH were above 90 years. With regards to the ethnic groups the majority belonged to the native ethnics of the region namely the *Ewe* (50.00%) and *Mina* (25.00%). Three religions were recorded; the Animists, the Christian and the Muslims, but the most represented were the Animists (43.75%) and the Christians (41.41%). Concerning the educational level, the TH could be ranged the following groups: the illiterates, the primary school level, the secondary school level and the university level, with respective contributions of 23.44, 39.06, 31.25 and 6.25%. The TH who attended primary school level were more compared to secondary school ($p=0.0003$) and university level. The familial heritance, the initiation from a senior TH and the divine revelation were the recorded means of transmission of the medicinal practice among the surveyed TH. Our results indicated that the family inheritance accounting for 42.97% of TH was the most common mean for the transmission of the knowledge, followed by the divine revelation and the traditional ($p<0.0001$). The TH in the formal sector (44.53%), thus exerting the traditional medicine as a secondary occupation were more represented in the Hypertension treatment compared to either artisans ($p<0.0001$) or farmers ($p=0.0002$). Only 22.66% TH exerted the traditional medicine as the unique source of revenue. Thus we could find that for the payment, the majority (49.22%) of them receives the payment after pain relief but an important portion (35.16%) receives the payment before the treatment. Some of the TH (23.44%) argued they collaborate with the modern medicine by referring the most complicated cases, the other do not collaborate.

Table 1 : Socio-demographic profile of the surveyed traditional healers

Characteristics	Groups	Respondents N(%)
Gender	Males	83(64.84)
	Females	45(35.16)
Age (years)	<30	12(9.38)
	[30-50[	40(31.25)
	[50-70[	54(42.19)
	[70-90[	20(15.63)
	>90	2(1.56)
Ethnicity	Ewe	64(50.00)
	Mina	32(25.00)

	Other	32(25.00)
Religion	Animists	56(43.75)
	Christians	53(41.41)
	Muslims	19(14.84)
Educational level	Illiterates	30(23.44)
	Elementary school	50(39.06)
	Secondary school	40(31.25)
	University	8(6.25)
Origin of the knowledge	Familial heritance	55(42.97)
	Initiation from a TH	36(28.13)
	Divine revelation	37(28.91)
Collaboration with modern medicine	Collaborative	30(23.44)
	Non collaborative	98(76.56)
Professional status of the TH	Full time profession	29(22.66)
	Farmer	31(24.22)
	Artisans	11(8.59)
	Formal sector	57(44.53)
Honoraria	Before the treatment	45(35.16)
	During the treatment	20(15.63)
	After the healing	63(49.22)

Symptoms used by TH for the diagnosis of High Blood Pressure

A total of 8 symptoms were identified (table 2). A particular symptom was not used alone to identified the disease, hence a TH could cited more than two symptoms in the diagnosis of the disease. According to table 2, all the TH cited the nosebleeds as the main symptom of hypertension. In the order of importance the other symptoms were ranged as follows: Headache, swarming, loss of consciousness, dizzy spells, anxiety, shortness of breath and the fear of height.

Table 2: The symptoms of hypertension cited by the surveyed traditional healers

Symptoms	Respondents N (%)
Nosebleeds	128(100.00)
Headache	118(92.19)
Swarming	112(87.50)
Loss of consciousness	111(86.72)
Dizzy spells	107(83.60)
Anxiety	92(71.86)
Shortness of breath	75(58.59)
Fear of height	67(52.34)

Diversity of medicinal plants and their usage in the treatment of Hypertensionin the maritime region

A total of 116 plants species ranged in 46 families were recorded in the present study. The plants consisted of trees, herbs, lianas and shrubs; the most frequent growth habits being the trees and shrubs. They accounted for 56.41% and 22.05 % respectively (figure 2). The species were diversely distributed among botanical families. Thus, some families were more represented than others. The most represented family was the Fabaceae that contributed with 16 species namely *Baphia nitida* Lodd., *Indigofera pulchra* Willd., *Milletia thonningii* Baker., *Parkia biglobosa* Benth., *Pericopsis laxiflora* Benth. Ex Baker Meeuwen , *Xeroderris stuhlmannii* Taub Mendoça & E.P. Sousa , *Callindra haematocephala* , *Afzelia Africana* Sm. , *Cassia occidentalis* L. , *Senna hirsute, Piliostigma thonningii* (Schum.) Milne-Redh. , *Senna occidentalis* (L.) Link ,*Senna alata*(L.) Roxb,), *Albizia adianthifolia* schumwhight, *Uraria picta* , *Afrormosia laxiflora* Benth. Exbak. Harms. This was followed by Euphorbiaceae contributing with 8 species (*Croton lobatus* L., *Elophorbia grandifolia* (Haw.) Croizat, *Euphorbia hirta* L., *Jatropha curcas* L., *Jatropha gossypiifolia* L., *Phyllanthus amarus* Schum., *Ricinus communis* L. and *Securinega virosa* Willd. Baill.) and Rutaceae with 6 species(*Citrus aurantifolia* (Christm.) Swingle, *Citrus aurantium* L., *Citrus grandis* Hassk., *Clausena anisata* (Willd.) Hook.f. ex Benth., *Fagara macrophylla* Engl., and *Zanthoxylum zanthoxyloides* (Lam.) Zepern. & Timler). The other families contributed with less than 5 species.

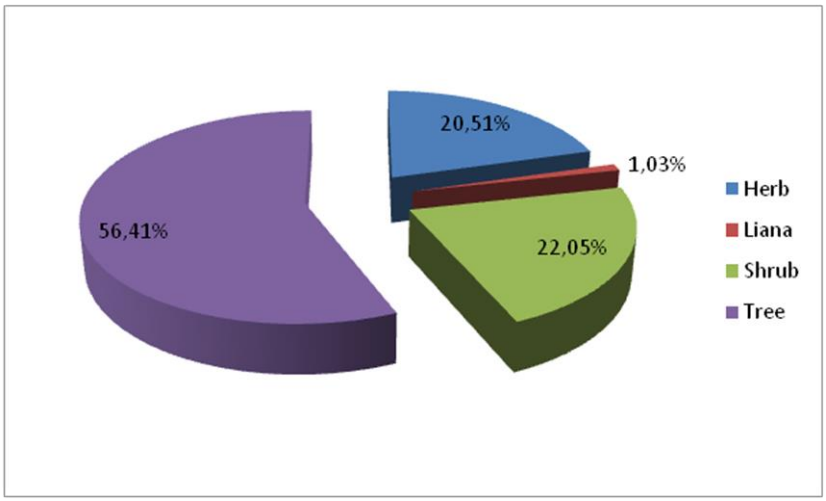

Figure 1 : Growth habits of medicinal plants used in the management of hypertension

The importance of medicinal plants was assayed by the calculated use values (UV) that were ranged between 0.05 for the less used species and 0.47 for the most used species (table 3). Considering these UV, the following species appeared to be of great importance for the management of hypertension in the surveyed region: *Byrsocarpus coccineus* Schum. Etthonn. (UV = 0.47*) ; Crateva religiosa* G. Forst. (UV = 0.47*), Boerhavia diffusa* Engelm. &A.Gray L. (UV = 0.47), *Xylopia aethiopica* A. Rich. *(*UV = 0.42), *Mangnifera indica* L. *(*UV = 0.38).

The TH in the maritime region of Togo were found to use various parts of plant in the treatment of hypertension. Figure 3 displays the trends of use of the various plants parts. The leaves (52.63%) are the main parts of plants used in the preparations of recipes for the treatment of High Blood Pressure.

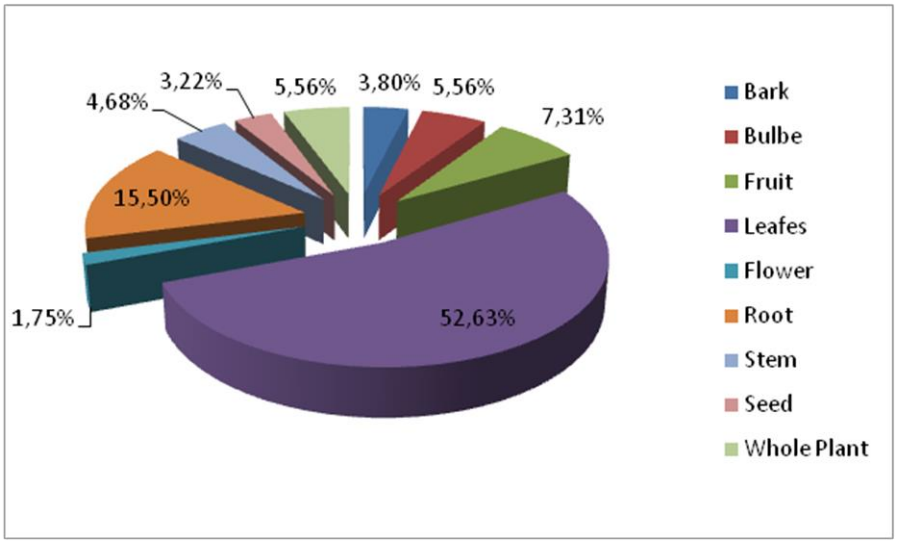

Figure 2 : Parts of the plants used for the treatment of High Blood Pressure.

A total of 7 modes of preparation including decoction, infusion, powder, tea, crushing, alcoholic maceration and juice, were identified. Decoctions were obtained by boiling either fresh or dried materials in water. However the amount and the duration varied from one TH to another. In some cases, the TH could give the prepared decoction or in other cases the TH gives the plant materials and the indications to prepare the recipes. Crushing was obtained from fresh materials by direct pounding in a mortar and the filtration through a tissue and the filtrate could be directly administrated in the appropriate dose by oral route. The juice from Rutaceae was obtained by pressure of the fruit. The tea was obtained by maceration of dried materials in water for the appropriate time and administrated by oral route. Only one case of alcohol maceration was recorded in the case of *Chenopodium ambrosiodes* L. This is prepared by maceration of the powder of leaves in the traditionally distillated liquor from palm wine locally known as *Sodabi*. In some cases, there are additives such as honey, or milk the TH recommend the use. According to our results, decoctions were more used by TH compared to the powder (p=0.15). Both were predominantly used by TH compared to other formulations (Figure 4).

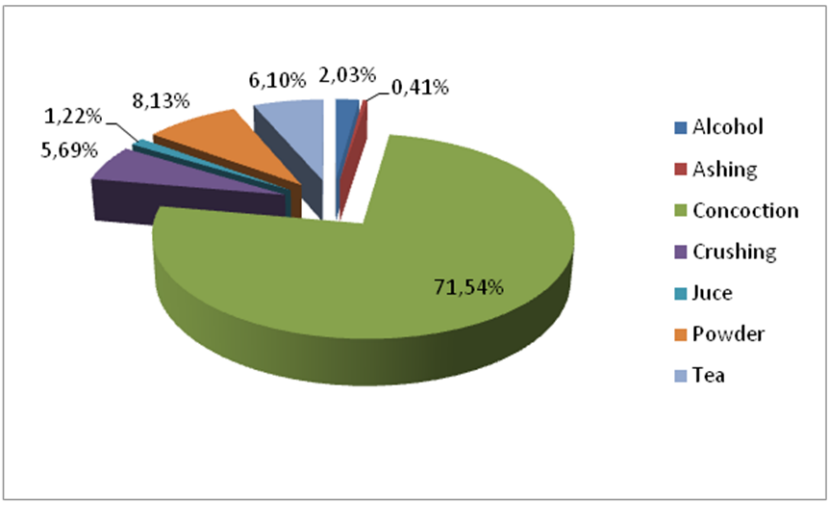

Figure 3 : Mode of preparation of recipes used in the management of hypertension

As indicated in figure 5, most of the formulations were administrated by the oral route (91.06 %, $p<0.0001$). This was followed by bath (5.28 %).In contrast, few TH preferred bandage, massage, poultice, cataplasm and smoking.

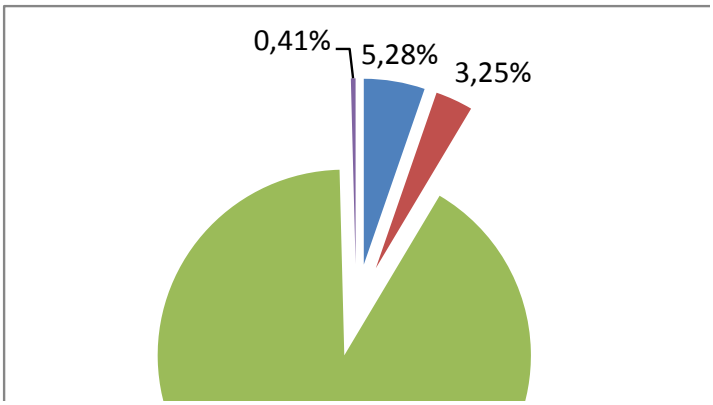

Figure 4 : Administration route of medicinal recipes used in the management of hypertension

Table 3: Diversity of medicinal plants and their uses for the treatment of liver damage in the Maritime Region

Family	Species	Local name	Voucher N°	UV	Used parts	Habits	Mode of preparation	Route	Previous citation
Amaranthaceae	*Gomphrena celosioides* C. Mart.	Amegatahe	Togo 01731	0,09	WP	Herb	Dec, Inf	oral	(Adjanohoun et al., 1991)
	Aerva lanata (L.) A. L. Juss.	Eweowo	-	0,05	WP	Tree	Inf	Oral,	(Adjanohoun et al., 1991) (Cisse et al., 2016)
Anacardiaceae	*Sclerocarya birrea* (A.Rich.) Hochst.	-	1828	0,09	Fl	Tree	Dec.	Oral	(Adjanohoun et al., 1991)
	Anarcadium occidentale L.	Yovotsan	Togo 01768	0,19	St	Tree	Dec.	Oral,	(Tchacondo et al., 2011 ; Karou et al., 2011 ; Tra Bi et al., 2008 ; Tokoudagba et al., 2009 ; Kayode, 2006)
	Mangnifera indica L.	Amangoti	1157FDS/UL	0,38	Lf	Tree	Dec	oral	(Cisse et al., 2016)
Annonaceae	*Annona senegalensis* Pers.	Dzogbenyikli	Togo 01881	0,09	Le	Tree	Dec.	Oral,	(Karou et al., 2011)
	Xylopia aethiopica A. Rich.	Etso	1987	0,42	St	Tree	Dec.	Oral	(Karou et al., 2011 ; Tokoudagba et al., 2009)
	Zea maïs L.	Ebli	-	0,09	Fr	Tree	Dec.	Oral	(Orch et al., 2015 ; Sereme et al., 2008)
Apocynaceae	*Catharanthus roseus* L. G.Don	Flawavigbé	95FDS/UL	0,09	Lf	Shrub	Dec.	Oral,	(Karou et al., 2011 ; Tra Bi et al., 2008)
	Picralima nitida Th. &H.Dur.	Ayokpè	2105/220FDS/UL	0,09	Sd	Shrub	Dec.	Oral	(Karou et al., 2011)
	Rauvolfia vomitoria Afzl.	Dodemakpowoe	TG12750	0,05	Bk	Shrub	Dec, Pow	Oral	(Adjanohoun et al., 1991 ; Padal et al., 2010)
	Strophantus hispidus	Sagere/dikuyintin	-	0,05	Rt	Herb	Dec.	Oral	(Adjanohoun et al., 1991)
Arecaceae	*Cocos nucifera* L.	Netsi	02481TG Clt/AK	0,09	Rt	Tre	Dec	Oral	(Karou et al., 2011)
	Raphia hookeri G. Mann & H. Wendl.	Plamploti-ma	470FDS/UL	0,09	Fl	Herb	Dec, Cru	Oral	(Adjanohoun et al., 1991)
Asclepiadaceae	*Pergularia aemia*	-	2314	0,09	Lf	Tree	Dec.	Bath	(Adjanohoun et al., 1991)
Asteraceae	*Vernonia amygdalina* Delile	Aluma/Gbondutsi	Togo 01204	0,09	Le	Shrub	Dec, Pow	Oral	(Karou et al., 2011)
	Vernonia cinerea (L.) Less.	Hunssikonou	-	0,09	Lf	Shrub	Dec	Oral	(N'Guessan et al., 2011 ; Karou et al., 2011 ; Tra Bi et al., 2008)
	Acanthospermum hispidum DC.	Apegbin	00749TGClt/AK	0,28	Le	Herb	Dec	Oral,	(Tokoudagba et al., 2009)
	Bidens pilosa Linn.	-	841	0,09	Lf	Tree	Dec.	Oral,	(Dibong et al., 1997)
Bignoniaceae	*Kigelia Africana* (Lam.) Benth.	Gnakpekpe	1816*	0,05	Bk	Tree	Dec.	oral	(Adjanohoun et al., 1991)
	Newbouldia laevis (P. Beauv.) Seeman ex. Bureau	Kpatsima	337FDS/UL	0,19	Le	Tree	Dec.	oral	(Adodo, 2004)
	Stereospermum kunthianum Cham.		-	0,05	St	Herb	Dec.	Oral	(Adjanohoun et al., 1991)
Bombacaceae	*Adansonia digitata* L.	Adidotima	1190FDS/UL	0,19	Le	Tree	Pow	Oral,	(Tra Bi et al., 2008)
	Ceiba pentandra L. Gaerth.	-	2485	0,09	Lf	Tree	Dec.	Oral,	(Tra Bi et al., 2008)
Boraginaceae	*Heliotropium indicum* L.	KoklotadoèAgamashike	Togo 02508	0,05	Lf	Dec/Orl	Dec.	oral	(Tokoudagba et al., 2009)
Capparaceae	*Crateva religiosa* G. Forst.	Awatayisan	00326TGClt/AK	0,47	Bk	Tree	Dec	Oral	(Tokoudagba et al., 2009)
Chenopodiaceae	*Chenopodium ambrosiodes* L.	Arunpale	-	0,05	Lf	Shrub	alc	Oral,	(Orch et al., 2015)

Connaraceae	*Byrsocarpus coccineus* Schum. Et thonn.	tomégavigbé	12603	0,47	Lf	Tree	Tea	Oral,	(Tokoudagba et al., 2009)
Cucurbitaceae	*Momordica charantia* L.	Agnagnra	2799/6182 FDS/UL	0,09	WP	Liana	Dec, Pow	oral	(Karou et al., 2011 ; Tra Bi et al., 2008)
	Adenopus breviflorus	Tagiri	-	0,05	Fr	Tree	Cru	Oral,	(Adjanohoun et al., 1991)
Dracaenaceae	*Dracaena arborea*	Anyantsi	Togo 09453	0,05	Le	Tree	Dec	Oral	(Ajibesin et al., 2008)
Ebenaceae	*Diospyrosmes piliformis* Hochst.	Tigbado	672FDS/UL	0,38	TF	Tree	Dec	Oral	(Karou et al., 2011)
Euphorbiaceae	*Croton lobatus L.*	Eru	-	0,05	Fr	Tree	Dec	Oral	(Adjanohoun et al., 1991)
	Elophorbia grandifolia (Haw.) Croizat	-	-	0,19	WP	Tree	Dec	Oral	(Adjanohoun et al., 1991)
	Euphorbia hirta L.	Hundihundi	454FDS/UL	0,19	Le	Shrub	Dec	Smoking	(Tra Bi et al., 2008)
	Jatropha curcas L.	Babatihé	-	0,19	Lf	Tree	Dec.	oral	(Tra Bi et al., 2008)
	Jatropha gossypiifolia L.	Babatidzin	-	0,19	Lf	Tree	Dec.	oral	(Tokoudagba et al., 2009)
	Phyllanthus amarus Schum.	Ahlivi	Togo 03349	0,09	WP	Herb	Dec.	Oral	(Tchacondo et al., 2011 ; Tra Bi et al., 2008)
	Ricinus communis L.	Kassouwèlti	3729	0,09	Fl	Shrub	Dec.	Oral	(Karou et al., 2011 ; Tra Bi et al., 2008)
	Securinega virosa Willd. Baill.	Hésreé	3750	0,09	Fl	Tree	Dec.	Oral	(Adjanohoun et al., 1991)
Fabaceae	*Afzelia africana* Sm.	Welou	-	0,09	Se	Herb	Dec,Tea	Oral,	(Karou et al., 2011)
	Baphia nitida Lodd.	Eto	-	0,09	Bk	Tree	Dec.	Oral,	(Adjanohoun et al., 1991)
	Callindra haematocephala	Tude	-	0,05	Rt	Herb	Pow	oral	(Adjanohoun et al., 1991)
	Indigofera pulchra Willd.	Okamon	Togo 06308	0,05	Lf	Tree	Dec.	oral	(Adjanohoun et al., 1991)
	Milletia thonningii Baker.	Kodoliya	6397	0,09	Rt	Tree	Dec.	oral	(Karou et al., 2011)
	Parkia biglobosa Benth.	Ewoati	329FDS/UL	0,19	Lf	Tree	Dec.	oral	(Karou et al., 2011 ; Tra Bi et al., 2008 ; Tokoudagba et al., 2009)
	Pericopsis laxiflora Benth.	Tchamani	6492	0,09	Lf	Tree	Dec.	Bath	(Karou et al., 2011)
	Xeroderris stuhlmannii Taub Mendoça & E.P.Sousa	Tchalawâri	6768	0,09	Rt	Tree	Dec.	Oral	(Karou et al., 2011)
	Cassia occidentalis L.	Bessisan	115	0,09	Se	Shrub	Dec.	Oral,	(Tra Bi et al., 2008)
	Senna hirsute (L.) H.S. Irwin & Barneby	Madonsohomé	29	0,09	Fl	Shrub	Dec.	Oral	(Adjanohoun et al., 1991)
Fabaceae / Caesalpiniaceae	*Piliostigma thonningii* (Schum.) Milne-Redh.	Klo	Togo 0024	0,05	Lf	Tree	Dec.	Oral	(Karou et al., 2011)
	Senna alata (L.) Roxb,)	Yovologbo	378FDS/UL	0,05	Lf	Shrub	Dec, Pow	Oral	(Adjanohoun et al., 1991)
	Senna occidentalis (L.) Link	Bessissan	-	0,05	Lf	Herb	Dec.	Oral	(Adjanohoun et al., 1991)
Fabaceae/Mimosoideae	*Albizia adianthifolia* schumwhight	Agla	4853137FDS/UL	0,09	Le	Herb	Dec	Oral,	(Tra Bi et al., 2008)
	Afrormosia laxiflora Benth. Exbak.Harms	-	-	0,09	Se	Herb	Dec,Tea	Oral,	(Adjanohoun et al., 1991)
	Uraria picta (Jacq) DC.	-	-	0,05	Le	Shrub	Dec.	Oral	(Orch et al., 2015)
Hypoxidaceae	*Curculigo pilosa* (Schumach. &Thonn.) Engl.	Epekun	-	0,05	WP	Tree	Dec	Oral	(Adjanohoun et al., 1991)
Iridaceae	*Gladiolus psittacinus* Hook.	Baka	-	0,05	WP	Herb	Dec	oral	(Adjanohoun et al., 1991)
Lamiaceae	*Hyptis suaveolens* L. Poit.	Botifadini	-	0,09	Lf	Tree	Dec.	oral	(Karou et al., 2011)
	Ocimum basilicum L.	Ahameyovoto	04199TGClt/AK	0,09	Fl	Shrub	Dec	oral	(Karou et al., 2011 ; Orch et

									al., 2015)
	Ocimum canum Sims	Ahamè	Togo 04196	0,09	Le	Shrub	Pow	Massage, Poultice	(Karou et al., 2011)
	Ocimum gratissimum L.	Esrou,Deveti	1197FDS/UL	0,19	WP	Shrub	Dec, Pow	Bath	(N'Guessan et al., 2011), (Karou et al., 2011 ; Tra Bi et al., 2008)
Lauraceae	*Persea americana* Mill.	PEYA	-	0,09	Lf	Tree	Dec.	Oral	(Karou et al., 2011 ; Tra Bi et al., 2008)
Liliaceae	*Alium cepa* L.	sabulè	300FDS/UL	0,19	Bu	Herb	Tea	Oral,	(Karou et al., 2011 ; Tra Bi et al., 2008 ; Orch et al., 2015 ; Tokoudagba et al., 2009)
	Allium sativum L.	Ail, ayo	296FDS/UL	0,19	Bu	Herb	Pow	Oral,	(Karou et al., 2011 ; Tra Bi et al., 2008 ; Orch et al., 2015 ; Tokoudagba et al., 2009)
Loganiaceae	*Anthocleista djalonensis* A. Chev.	Gboloba	4781	0,09	Rt	Tree	Dec.	Oral,	(Karou et al., 2011 ; Tra Bi et al., 2008)
Malvaceae	*Gossypium arboretum* L.	Cotonnier	693FDS/UL	0,05	Se	Shrub	Dec, Pow	oral	(Adjanohoun et al., 1991)
	Hibiscus sabdariffa L.	Anyaba	4431	0,09	Lf	Shrub	Dec.	oral	(Tra Bi et al., 2008)
	Sida linifolia Juss.	Odoe-ogbogbo	4488	0,09	Le	Herb	Dec.	Oral	
Meliaceae	*Azadiractha indica* A.Juss.	Kiniti	04647TgClt/AK	0,09	Lf	Tree	Dec.	Oral,	(Tra Bi et al., 2008)
	Khaya senegalensis A. Juss.	Mahoghen	4674	0,09	Le ; St	Tree	Dec.	oral	(Karou et al., 2011)
	Pseudocedrela kotschy i(Schweinf.) Harms	Yotsa	7719 FDS/UL	0,05	Bk	Tree	Dec.	Oral	(Karou et al., 2011)
Moraceae	*Ficus exasperate* Vahl	Sampepa	Togo 05094	0,05	Rt	Herb	Dec	oral	(N'Guessan et al., 2009)
	Artocarpus altilis (Parkinson) Fosberg	Bere fruit	-	0,09	Bk	Tree	Dec.	Oral,	(Adjanohoun et al., 1991)
Moringaceae	*Moringa oleifera* Lam.	Yovovitsi	05250TG Clt/AK	0,09	Le	Tree	Dec.	oral	(N'Guessan et al., 2011 ; Karou et al., 2011)
Musaceae	*Musa paradisiacal* L.	Banane	1043FDS/UL	0,05	Pw	Tree	Dec.	oral	(Adjanohoun et al., 1991)
Myrtaceae	*Psidium guajava* L.	Gbèbèti	470FDS/UL	0,23	Lf	Tree	Dec.	Oral	(Karou et al., 2011 ; Tra Bi et al., 2008)
	*Syzygium guinensis (*Willd.) DC.	Igiaro		0,05	Rt	Herb	Dec.	Oral	(Adjanohoun et al., 1991)
Nephrolepidaceae	*Nephrolepis undulate* (Afzel. Ex Sw.) J. Sm.	Fougère de palmier	Togo 12492	0,05	Le	Tree	Dec.	oral	(Adjanohoun et al., 1991)
Nyctaginaceae	*Boerhavia diffusa* Engelm. &A.Gray L.	Ahozemeklo	Togo 05309	0,47	Rh	Tree	Dec.	Oral,	(N'Guessan et al., 2009)
	Boerhaviaerecta L.	Babakou	5319	0,09	Lf	Shrub	Dec.	Oral,	(N'Guessan et al., 2009)
Opiliaceae	*Opilia amentacea* roxb.	Méfiodudami	5525	0,09	Lf	Herb	Dec.	oral	(Karou et al., 2011)
Rubiaceae	*Sarcocephalus latifolius* Sm.	Nyimon	7536	0,09	Rt	Tree	Dec.	oral	(Tra Bi et al., 2008)
	Gardenia ternifolia Schumach.	Kawouti	7361	0,09	WP	Herb	Dec	oral	(Karou et al., 2011 ; Tokoudagba et al., 2009)
	Morinda lucida Benth.	Zanklan	Togo 07503/7497	0,09	Rt	Tree	Dec.	oral	(Karou et al., 2011)
	Oxyanthus speciosus DC. subsp. stenocarpus (K. Schum.) Bridson		-	0,14	Lf	Herb	Cru	Cataplasm	(Adjanohoun et al., 1991)

Rutaceae	*Citrus aurantifolia* (Christm.) Swingle	Dontsi	Togo 02480	0,05	Fr	Tree	Jce	Oral,	(N'Guessan et al., 2009)
	Citrus aurantium L.	N'ti	782FDS/UL	0,09	Lf	Tree	Tea	Oral	(Karou et al., 2011)
	Citrus grandis Hassk.	Azongbo	44FDS/UL	0,05	Fr	Tree	Dec	Oral	(Karou et al., 2011)
	Clausena anisata (Willd.) Hook.f. ex Benth.	Eyra	08028TGClt/AK	0,05	Ro	Shrub	Dec	Oral	(Adjanohoun et al., 1991)
	Fagara macrophylla Engl.	Ehéti	8055	0,09	Lf	Tree	Dec	oral	(N'Guessan et al., 2011)
	Zanthoxylum zanthoxyloides (Lam.) Zepern. & Timler	Ganhopovi	-	0,14	St	Tree	Pow	Massage	(Adjanohoun et al., 1991)
Sapindaceae	*Blighia sapida* C. König	achanti	8087	0,09	Lf	Tree	Dec.	Oral,	(N'Guessan et al., 2011)
Sapotaceae	*Vitellaria paradoxa* C.F.Gaertn.	Somou	205FDS/UL	0,19	Ro	Tree	Tea	Bath	(Karou et al., 2011)
Solanaceae	*Schwenkia americana* L.	Kotoka	8558	0,09	Fl	Tree	Dec.	Oral	(Karou et al., 2011)
	Solanum ethiopicum L.	Agbissan	8519	0,09	Fr	Herb	Dec.	Oral	(Karou et al., 2011)
	Solanumlycopersicum L. (lycopersicumesculentus)	Timati	-	0,09	Fr	Shrub	Cru	Oral	(Karou et al., 2011)
Sterculiaceae	*Cola millenii* K. Schum	Kpandotsi	Togo 08606	0,05	Le	Tree	Dec	Oral	(Karou et al., 2011)
	*Cola nitida S*chott & Endl.	Goro	8612	0,09	Le	Tree	Dec	Oral	(Karou et al., 2011 ; Tra Bi et al., 2008)
	Theobroma cacao L.	Coco	8669	0,09	Se	Tree	Dec.	Oral	(Karou et al., 2011)
	Waltheria indica L.	-	8678	0,09	Rt	Tree	Dec.	Oral	(Adjanohoun et al., 1991 ; Cisse et al., 2016)
Ulmaceae	*Trema guineensis* (Schumach. &Thonn.) Ficalho	Waza - Waza	08974TGClt/AK	0,05	WP	Shrub	Dec.	Oral	(Adjanohoun et al., 1991)
Verbenaceae	*Gmelina arborea* Roxb.	Gboviti	-	0,09	Lf	Herb	Dec	oral	(Karou et al., 2011)
	Lippia multiflora Moldenke	Avondati	09207TG Clt/AK	0,05	Lf	Shrub	Tea	oral	(Adjanohoun et al., 1991)
	Stachytarpheta angustifolia Mill. Vahl	Tchoumboulouzou	9255	0,09	Rt	Herb	Dec.	Oral	(Karou et al., 2011)
Zingiberaceae	*Aframomum melegueta* K.Schum.	Atakun	204FDS/UL	0,05	Se	Herb	Dec, Tea	Oral,	(Adjanohoun et al., 1991)
	Zingiber officinale Roscoe	Dotè	348FDS/UL	0,05	Rh	Shrub	Tea	Oral	(Adjanohoun et al., 1991)

Le (Leaves), WP (Whole plant), Rt (Roots), St (Stem), Bu (Bulb), Bk (Bark), Rh (Rhizome), Fr (Fruit), Lf (leafy stem), Se (Seed), Dec Decoction), Pow (Powder), Inf (Infusion), Cru (Crushing), Pow (powder).

Discussion

The present survey was undertaken to identify medicinal plants used in the south of Togo for the treatment of hypertension. We were first interested in the mode diagnosis of the disease by the TH. The results revealed that all the surveyed TH were able to cite the mains symptoms. We observed that severe headache, severe anxiety, shortness of breath, nosebleed, Loss of consciousness and fear of heights were commonly used by TP to diagnose the disease before the treatment. However the risk of misdiagnosis remains, as very few of them collaborate with the modern medicine. In fact, some authors reported the problems of misdiagnosis by traditional healers for some diseases that were not common in African areas. These diseases often called emerging diseases in Africa included cancers and metabolic diseases like hypertension (Alonso-Castro et al., 2011; Taylor et al., 2014).

Different plants species were used by Togolese TH to heal hypertension attack. There were 116 species of plants with the Fabaceae family as the most dominant with 16 species. In the same context, a previous study was carried out in the central region of the Togo (Karou et al., 2011). The study enabled the identification of 38 antihypertensive recipes; while in a similar study Tsabang et al. (2016) identified 71 recipes both treating arterial hypertension and diabetes in Cameroon. The recipes from Togolese TH were made from 64 plant species in the flora of Togo. The most commonly cited as antihypertensive were *Parkia biglobosa*, *Khaya senegalensis*, *Gardenia ternifolia*, and *Persea americana*. In comparison with previous published reports, the THs of the Togo Central Region were found to have basic knowledge regarding herbal medicine for the treatment of hypertension [19]. Investigations on medicinal plants in the markets of Abidjan allowed the inventory of 58 species of plants used to treat 19 current diseases (N'Guessan et al., 2009). Thirty-nine of these plants were used against arterial hypertension and diabetes. These plants were *Catharanthus roseus* (L.) G Don, *Ageratum conyzoides* L, *Vernonia colorata* (Willd.) *Drake, Alchornea cordifolia* (Schum.& Thonn.)Müll.Arg., *Phyllanthus amarus Schum*.& Thonn.and *Parkia biglobosa* (Jacq.) Benth (N'Guessan et al., 2009). In morocco an ethnobotanical surveys allowed an inventory of 57 medicinal plant species belonging to 52 genera and 30 families. Of these, 40 are traditionally used against diabetes and 30 against hypertension (Ziyyat et al., 1997; Tahraoui et al., 2007).

In Benin a neighboring country of Togo, ethnobotanical surveys were carried out with 36 trait-therapists from the Bassila district using individual interviews. A total of 23 plant species belonging to 16 botanical families were reported to have antihypertensive properties. The most cited species were *Parkia biglosa*, *Allium sativum*, *Allium cepa* and *Cassia sieberiana*. The root was the most widely used plant organ and the decoction was the main mode of preparation of medicinal products which are generally administered orally (Anselme Bio et al., 2005). Another ethnopharmacological studies have identified medicinal plants used for their antihypertensive properties of which eleven were harvested and tested for the vasodilatory activity. Two species namely *Parkia biglobosa* and *Spondias mombin* displayed promising results (Anselme Bio et al., 2005).

In the present study the most important plants were *Byrsocarpus coccineus*, *Crateva religiosa* and *Boerhavia diffusa* on the basis of the use value. These three plants were already cited in the literature for similar use in the traditional medicine. Moreover, Dada et al. screened *Byrsocarpus coccineus* for its antihypertensive activity and found an interesting activity of the hydroethanolic leaf extract in relation with the antioxidant property and improvement of lipid profile (Dada et al., 2013).

Conclusion

This survey provides initial evidence of the use of plants by Togolese traditional medicine practitioners to manage Hypertension and this by family inheritance in traditional initiation manner, as the species were cited at least once in previous ethnobotanical reports. It is therefore necessary for scientist to go further in characterization of the biomolecules. The present inventory therefore represents the contribution of natural flora of Togo to the global approach in controlling hypertension.

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