



## Research article

# Ethnopharmacological survey of plants used in the treatment of diabetes mellitus in south of Togo (Maritime Region)



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## ABSTRACT

**Ethnopharmacological relevance:** Diabetes mellitus remains a major public health problem due to its incidence and prevalence. In Togo, several plants are used by the practitioners of traditional medicine in the treatment of this disorder. The objective of this work was to identify medicinal plants used by traditional practitioners in the treatment of diabetes mellitus in the Maritime area of southern Togo.

**Materials and methods:** Data was collected from 59 informants using a structured questionnaire.

**Results:** The use of sixty five (65) medicinal plant species were recorded as being used by traditional practitioners in the treatment of diabetes mellitus. The plants recorded are divided into 62 genera and 34 families. The families most represented were Euphorbiaceae (6 species) and Asteraceae (6 species). *Conyza aegyptiaca* (L.) was the specie with the highest relative frequency of citation (RCF 20.53%). The dominant plant part used in the preparation of remedies was the leaves (60.89%). A decoction (89.23%) was the main mode of preparation, while taking the remedies orally (98.44%) was the principal route of administration.

**Conclusion:** The results of the study indicated that the Maritime Region of Togo may have a range of plants that have antidiabetic activity. Further work is required to establish their clinical efficacy for this condition.

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## 1. Introduction

Diabetes mellitus is a disease characterized by a chronic hyperglycemia (fasting glucose  $\geq 1.2$  g/L) with or without insulin resistance. It presents in three forms: type I diabetes or insulin-dependent diabetes, type II diabetes or non-insulin dependent or mature onset diabetes and gestational diabetes. Type II diabetes which constitutes about 90% of all diabetes is characterized by obesity, insulin resistance, dysfunction of insulin secretion and glucose production by the liver (Rahimi et al., 2005). It is most often polygenic and results from a combination of genetic predisposition and environmental factors (Halimi, 2005).

Currently, the number of diabetic people worldwide has been estimated at about 285 million and it is predicted that this number could reach 366 million by 2030 (IDF, 2011). This growth is closely correlated with the age of the population and the increasing prevalence of obesity and inactivity (Haslam and James, 2005).

Diabetes is one of the commonest cause of disability and hospitalization and is a global financial burden (IDF, 2011). The disease has increasingly grown to become a public health problem (Fézanet et al., 2008).

In African countries such as Togo, rural populations find it difficult to access conventional drug therapy and thus the use of medicinal plants becomes an alternative. In regard to traditional medicine, the WHO resolution AFR/RC50/R, encourages African countries to develop strategies to undertake research on medicinal plants and promote their optimum use in systems of care health (WHO, 2006). In Togo, practitioners of traditional medicine (herbalists and traditional healers) use herbal medicines in various dosage forms such as decoction, infusion, maceration and crushed (powder) to treat diabetes mellitus. Research on some medicinal plants have proven their antidiabetic activity in animals (Tossou et al., 1994; Lawson-Evi et al., 2011; Eklú-Gadegbeku et al., 2012; Zhang et al., 2014; Bakoma et al., 2014, 2015).

The present study was carried out to identify the medicinal plants used in the treatment of diabetes mellitus in the Maritime Region of Togo. The results of this study will provide a basis for

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further biological, phytochemical and pharmacological studies on the herbal remedies traditionally used to treat diabetes.

## 2. Materials and methods

### 2.1. Study area

Togo is a country located in western Africa. The country is bordered in the north by the Republic of Burkina Faso, in the east by the Republic of Benin, in the west by the Republic of Ghana and in the south by the Atlantic Ocean. Togo is divided into five economic regions from north to south: the Savannah Region, Kara Region, Central Region, Plateaus Region and Maritime Region (Fig. 1).

The survey was conducted in Lomé city and six prefectures of the Maritime area situated in the south of Togo. Covering an area of 6100 km<sup>2</sup>, the Maritime Region extends between longitude 1° 20' west to 1° 50' longitude east and between latitude 6° 10' south to latitude to 6° 60' north (Fig. 1). The coastal plain has severely degraded vegetation (Kokou, 1998). The soils of the area have a set detrital age post-eocene located along the Atlantic Ocean. The soils encountered are essentially waterlogged. The climate is sub-equatorial type and comprises a long rainy season from March to July and a short rainy season from September to November. Rainfalls in the study area vary from one geographic point to another and from one period to another. Phytogeomorphological characteristics of the area show that the vegetation is formed essentially of savannah; however, there are some forest formations. The demographics of the area revealed a density of 50–200 inhabitants per km<sup>2</sup>

### 2.2. Methodology

The collection of data from traditional healers was based on ethnobotanical surveys from questionnaires pre-prepared by the authors (Supplementary data Appendix 1). Interviews and discussions with the healers were conducted randomly in Ewe and Mina, languages spoken mainly in the coastal region. The survey involved 59 traditional practitioners distributed as follows:

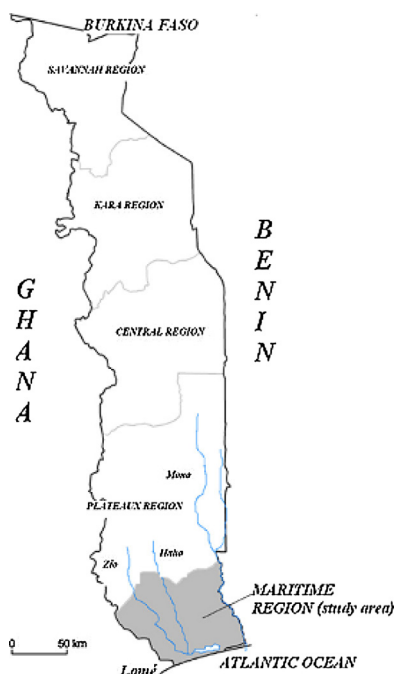


Fig. 1. Map of Togo showing the study area—the Maritime Region.

Lomé city (29) and 6 prefectures:- Tsévié (5), Ahépé (4), Tabligbo (7), Aklakou (6), Vogon (4) and Bagbé city (4). Information was collected using a recorder PA-VRIOE (SHARP). The profile of the respondents (age, sex, religion, education and experience), knowledge of diabetes mellitus and the identification of plants (parts used, method of preparation, mode of administration) used in the treatment were recounted (Table 1).

### 2.3. Plant identification

Voucher specimens were collected with the aid of informants for all the quoted plant species during the survey. Identification of the plants was effected using the taxonomic keys of online databases of PROTA (PROTA4U, Plant resources of Tropical Africa) on the website: [www.prota.org](http://www.prota.org) and database of IPNI website: <http://www.ipni.org/ipni/plantnamepage.do>. The herbarium specimen was prepared and deposited at the Botanical Garden of the University of Lomé for comparison and confirmation of the field plants' identification.

### 2.4. Relative frequency of citation (RFC)

Local importance of each plant species was calculated based on the relative frequency of citation (Yetein et al., 2013). The RFC was calculated as follows: number of informants who mentioned the use of the species (Fc), divided by the total number of informants (N).

**Table 1**  
Demographic data of the informants.

Characteristics	Number of informants	Frequency (%)
<b>Ages (year)</b>		
30–39	14	23.73
40–49	23	38.98
50–59	13	22.03
60–69	7	11.86
70–80	2	3.4
<b>Total</b>	<b>59</b>	<b>100</b>
<b>Sex</b>		
Female	23	38.98
Male	36	60.02
<b>Total</b>	<b>59</b>	<b>100</b>
<b>Religion</b>		
Animist	45	76.27
Christian	13	22.03
Muslim	1	1.7
<b>Total</b>	<b>59</b>	<b>100</b>
<b>Education</b>		
Illiterate	42	71.18
Primary level	12	20.34
Secondary level	4	6.77
Higher education level	1	1.7
<b>Total</b>	<b>59</b>	<b>100</b>
<b>Professional experience (years)</b>		
≤10	3	5.08
Oct–19	48	81.36
20–29	8	13.56
<b>Total</b>	<b>59</b>	<b>100</b>

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