

# Hypoglycaemic Medicinal Plants Used by Diabetics at CNHU-HKM

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## Abstract

**Introduction:** Diabetes is a major public health problem. Medicinal plants are frequently used either combine with industrial treatment or exclusively, in Africa and particularly in Benin. Our study aims to identify the different medicinal plants used by diabetic patients at the CNHU-HKM. **Method:** we carried out a descriptive and analytical cross-sectional study. It took place at the University Clinic of Endocrinology, Metabolism and Nutrition of CNHU-HKM over a of 3 months period from 20<sup>th</sup> of June to 16<sup>th</sup> of September, 2022, over diabetic followed-up. **Results:** One hundred and seventy-three (173) patients were gathered using an anonymous inquiry form. In the study population, the age of the patients varied between 31 and 75 years with an average age of 59 +/- 1.43 years, women represented 59% with a sex ratio (male/female) of 0.69. Sixty-five (65) or 37.6% of the population had used medicinal plants. Among given reasons for using medicinal plants were, mainly the positiveness on a third party. Data analysis outcome twenty-nine species of plants belonging to twenty (20) botanical families, the most represented being the Annonaceae and Fabaceae. The most used species are *Phyllanthus amarus* (hlenwé in fon), *Mangifera indica* (mangatin in fon), *Momordica charantia* (gninsikin in fon), *Combretum micranthum* (kinkéliba in fon), and *Picralima nitida* (ayorkpè in fon). Most used parts of the plants are the leaves. The recipes are prepared mainly by infusion and are administered exclusively by mouth. Most of the patients who used the hypoglycaemic medicinal plants were satisfied and no adverse effects were reported by them. **Conclusion:** Hypoglycaemic medicinal plants could be subjected to pharmacognosy and marketed due to their richness in active components, after further toxicological studies.

## Keywords

Diabetes, Hypoglycaemic Medicinal Plants, Glycemic Imbalance, Chronic

## 1. Introduction

Diabetes increasingly represents a major global concern, especially in developing countries and particularly in Sub-Saharan Africa. According to WHO, worldwide prevalence of diabetes has almost doubled since 1980, from 4.7% to 8.5% in 2014 in the adult population [1]. According to the International Diabetes Federation (IDF), diabetes is one of the six leading causes of death worldwide [2]. According to Djrolo F *et al.*, the prevalence of diabetes in Cotonou was estimated at 3.3% in 2002 and 4.6% in 2007 [3]. Diabetes is a chronic disease with serious complications, which requires expensive long-term treatment. Its treatment considers dietary measures and industrial treatment. The use of plants medicinal use by diabetics is experiencing exponential growth. The percentage of diabetic patients using medicinal plants increases and we note a significant diversification of plants with the discovery new plants.

In Benin, traditional medicine based on plant extracts and natural active ingredients is used in the treatment of diabetes. Thus, some diabetic use medicinal plants either exclusively or in a combine way with medical treatment. Studies have revealed that many diabetic patients use medicinal plants for controlling their blood sugar levels. In 2003 in Conakry, out of 397 diabetic patients, 33% used plants to control their blood sugar [4]. In Morocco in 2015, out of 509 diabetic patients, 54% used with medicinal plants [5]. In 2008 in Algeria, out of 634 diabetic patients 62%regularly used medicinal plants [6].

## 2. Method

This was a descriptive and analytical cross-sectional study which took place over a 3 months period from June 20 to September 16, 2022. Population was diabetic followed or hospitalized in the university clinic of Endocrinology, Metabolism and Nutrition of CNHU-HKM during the period and who gave informed consent. Excluded are patients who have difficulty or unable to indicate the medicinal plants used. The dependent variables are plant use and the independent variables are sociodemographic characteristics: age; gender; housing; work ; level of education; socio-economic level; duration of diabetes; chronic complications; glycated hemoglobin level; family history of diabetes; treatment used; high blood pressure and dyslipidemia; plants parts used (stems, roots, leaves, seeds, fruits); method of administration (decoction, maceration, infusion, powder); dosage; the exclusive or association nature; reasons for use; side effects ; duration of phytotherapy. Data collection was undertaken using a standardized inquiry form, through a direct question-answer interview on the use of medicinal plants.

Data analysis was done using the software: Epi info 7.1, Epi-data 3.1 and Excel 2016. Data entry was done using Epi info 7.1 software. Verification and clear-

ance were carried out with STATA MP14. The comparison of frequencies and percentages (represented by the qualitative variables) was carried out with the Pearson's Chi<sup>2</sup> test or the Fisher exact test (if the Chi<sup>2</sup> test condition was not respected); the comparison of the means (represented by the qualitative variables) was made with the Student's test. A  $p < 0.05$  was considered statistically significant. In multivariate analysis, the logistic regression model was used. Logistic regression made possible to measure the association between the use of hypoglycaemic medicinal plants and its determinants. The choice of variables integrated into the logistic regression model is based on the statistical association between the variable and the event, measured by the odds ratio.

### 3. Results

We identified 173 diabetic patients. Sixty-five patients consume medicinal plants. The prevalence is 37.6% among diabetic using hypoglycaemic medicinal plants in the University Clinic of Endocrinology Metabolism Nutrition of the CNHU-HKM.

Sociodemographic characteristics of the population.

The average age of the patients is  $59 \pm 1.43$  years. The median age is 61 years and the extremes are 31 and 75 years. Most patients were female with a sex ratio (male/female) of 0.69.

Diabetic patients living in urban areas were the majority (64.7%).

Civil servants were the most represented (59.5%) followed by traders (23.1%) and housewives (7.5%). The majority of patients were educated (97.7%). Majority of patients (83.8%) had an average socioeconomic level. The bride and groom were the most represented (80.4%). Factors related to medicinal plants.

Medicinal plants used:

Sixty-five patients (37.57%) used medicinal plants. Twenty-nine (29) species have been recorded, grouped into 20 botanical families. The most represented botanical families are Annonaceae and Fabaceae. The most frequently species used are "Hlenwé", "Mangatin", "Gninsikin".

The scientific names, families belonging, vernacular names and the frequencies of use are gathered in the **Table 1**.

Most frequently used species (**Figures 1-3**).

Parts of the plant: leaves are the part most used by patients in their treatment 89.2%.

Reasons for use: sometimes-complicated reasons for use are numerous. The experience of other patients convinced most patients (84.6%) to use anti-hyperglycaemic plants.

Association with oral treatment: 61/65 (96.8%) users of medicinal plants add it with oral treatment. For almost one in two patients, treatment lasts less than a year.

Method of use: plants are much more used in the form of herbal tea and prepared by infusion.

**Table 1.** Scientific names of the different plants used, families they belong to.

Species	Botanic family	Vernacular name	Percentage (%)
<i>Phyllanthus amarus</i>	Euphorbiaceae	Hlenwé	19.6
<i>Mangifera indica</i>	Anacardiaceae	Mangatin	17
<i>Momordica charantia</i>	Annonaceae	Gninsikin	10.7
<i>Combretum micranthum</i>	Combretaceae	Kinkéliba	07.1
<i>Picralima nitida</i>	Apocynaceae	Ayokpè	06.3
<i>Vernonia amygdalina delile</i>	Asteraceae	Amanvivè	03.6
<i>Sarcocephalus lactifolius</i>	Rubiaceae	Kodo	03.6
<i>Laurus nobilis</i>	Lauraceae	Laurier	03.6
<i>Khaya senegalensis</i>	Maliaceae	Kailcédra	03.6
<i>Catharanthus roseus</i>	Apocynaceae	Bonjourbonsoirdo	02.7
<i>Ocimum gratissimum</i>	Lamiaceae	Tchiayo	02.7
<i>Moringa oleifera</i>	Anacardiaceae	Moringa	01.8
<i>Launaea taraxacifolia</i>	Asteraceae	Gnantoto	01.8
<i>Gardenia ternifolia</i>	Rubiaceae	Dakplado	01.8
<i>Cymbopogon citratus</i>	Poaceae	Tiiman	01.8
<i>Dialium guineensis</i>	Fabaceae	Assouissouiman	00.9
<i>Garcinia cola</i>	Clusiaceae	Ahowé	00.9
<i>Syzygium aromaticum</i>	Myrtaceae	Atikin gbadota	00.9
<i>Annona muricata</i>	Annonaceae	Agnigloué	00.9
<i>Abelmoschus esculentus</i>	Malvaceae	Févi	00.9
<i>Curcuma alismatifolia</i>	Zingiberaceae	Kpatiman	00.9
<i>Parkia biglobosa</i>	Fabaceae	Ahwatin	00.9
<i>Anchomanes difformis</i>	Araceae	Godoe	00.9
<i>Senna siamea</i>	Fabaceae	Kaassia	00.9
<i>Xylopiya aethiopica</i>	Annonaceae	Kpédjèlèkoun	00.9
<i>Neillia incisa</i>	Rosaceae	Soukousoukou	00.9
<i>Ceratotherca sesamoides</i>	Pedaliaceae	Kpééwori	00.9
<i>Citrus sinensis</i>	Rutaceae	Yovozintin	00.9
<i>Ceiba pertandra</i>	Malvaceae	Agouègoui	00.9

**Figure 1.** *Phyllanthus amarus* (hlenwé): Euphorbiaceae.



**Figure 2.** *Mangifera indica* (mangatin: Anacardiaceae).



**Figure 3.** *Momordia charantia* (gninsikin): Annonaceae.

Dosage: plants used in the form of herbal tea were estimated using two forms of glasses. The glass locally called “talokpévi” with a content of 40 ml and the bamboo glass 300 ml. No adverse effects related to medicinal plants have been reported by users.

Satisfaction: less more than half of users are satisfied with the treatment of their diabetes with medicinal plants (58.5%).

Complications in patients using medicinal plants: chronic complications of diabetes are observed mainly in patients consuming hypoglycemic medicinal plants: diabetic nephropathy 4.6% versus 1.7%, diabetic retinopathy 4.6% versus 1.7%, stroke 1.2% versus 0.6, diabetic neuropathy 41.2% versus 27%.

Analytic study (**Table 2**).

The use of medicinal plants is significantly associated with family history of diabetes, personal history of hypertension, glycemic control and the occurrence of chronic complications of diabetes.

#### 4. Discussion

One hundred and seventy-three (173) diabetic were collected. Population were larger in studies carried out by Selihi Z *et al.* (509) in 2015 in Morocco [5] and by Allali H *et al.* (634) in 2008 in Algeria [6]. This can be explained by the fact that our study was carried out in a hospital environment and that the prevalence of diabetes in Morocco and Algeria is higher than that of Benin because of a larger population. Most of patients (94.8%) were at least 40 years. These results

**Table 2.** Factors associated with the use of medicinal plants in the treatment of diabetes by CNHU patients.

	Medicinal Plants		P-value	OR	IC95% [OR]
	Yes	No			
family diabetes background					
No	36	77	0.03	1	
Yes	29	31		0.49	0.26 - 0.95
High BP					
No	35	40	0.03	1	
Yes	30	68		1.98	1.06 - 3.7
Diabetes duration					
<5	16	36		1	
5 - 10	18	19	0.22	2.13	0.89 - 5.1
≥10	31	53		1.31	0.62 - 2.75
HbA1C ration					
<6.5%	19	48		1	
6.5% - 8%	28	41	0.03	1.72	0.84 - 3.53
>8%	18	18		2.52	1.08 - 5.86
Chronic complication					
No	31	46	p < 0.00001	44.98	
Yes	34	62			13.17 - 153.54

agree with those of Allali H *et al.* [6] and those of Selihi Z *et al.* [5], who found 97% and 83.3% respectively. The predominance is female in our study. It is similar to the study carried out by Errajrari A *et al.* 62% in Morocco [7]. This is explained by the susceptibility of women to developing diabetes, linked to several factors such as a sedentary lifestyle, stress and obesity. The majority of patients had poorly controlled diabetes (60.1%), as in the study by Selihi Z *et al.* [5]. This could be explained by the less observance in diet means and therapy.

Sixty-five patients or 37.7% used medicinal plants. These results are different from those obtained in the study of Allali H *et al.* (62%) [6] and that of Errajrari A *et al.* (52%) [7]. This study allowed us to identify twenty-nine plants (29) belonging to 20 botanical families. Other ethnobotanical studies have revealed similar diversity of antidiabetic plants; Ziyyat A *et al.* identified 41 plants belonging to 36 families [8]; Allali H *et al.* identified 58 plants belonging to 38 botanical families [6]. It emerged from our study that the species most used by diabetic patients at CNHU-HKM are: Annonaceae and Fabaceae. These results have some similarities with some previous work. Thus in the study by Gbekley E *et al.* the most represented families were Fabaceae, Euphorbiaceae and Compositae [9]. In the study by Karou S *et al.*, Fabaceae were the most represented [8].

The leaves of the plants are the most used parts (89.2%) in the different preparations. Baldé N *et al.* had the same results [4], as in the study by Gbekley E *et al.* [9]. This could be explained by the fact that the leaves are easier to handle.

The positive experience of a third person convinced most patients (84.6%). Many studies have had similar results such as those of Errajari A *et al.* 80% (7) and Baldé N *et al.* 78% [4].

Plants are mainly used in combination with drug treatment (96.8%) as in the study by Errajari A *et al.* (7) (69%). This could be linked to the fact that patients use plants to accelerate the action of medications fearing the occurrence of hyperglycemia.

The recipes are mainly consumed in the form of herbal teas. The preparation of recipes is mainly done by infusion (64.6%). These results are like the studies of Selihi *et al.* [5]. On the other hand, Gbekley E *et al.* found that the preparations are mainly made by decoction [9]. No adverse effects were reported by patients. Which is not the case with Baldé N *et al.*, 18% of adverse effects [4]. Pharmaco-toxicological studies must be carried out to determine the potential adverse effects induced by these different plants.

Patients who consume plant-based recipes in combination with drug treatment mostly have poorly controlled diabetes compared to patients only taking OADs, as in the study by Selihi Z *et al.* [5].

This could be linked to the priority given to plants over medical treatment, through patients who take plants adding with OADs, which is often found expensive. Chronic complications of diabetes were present in 95.4% of medicinal plant consumers and in 31.5% of non-consumers. These results are like those of Selihi Z *et al.* [5]. In their study, complications were found in 75.1% of plant consumers and in 50.8% of non-consumers.

## 5. Conclusion

At the end of this study, it appears that the use of hypoglycemic medicinal plants in the treatment of diabetes mellitus is a reality. This use must be controlled to avoid glycemic imbalance. The study carried out made it possible to identify medicinal plants presumed to have hypoglycemic properties. Their use must, however, be based on the results of scientific studies that are still few in number. The pharmacognosy of these medicinal plants with hypoglycemic properties is essential before their authorization on the market. This study will serve as a basis for other, more in-depth scientific studies on different botanical species.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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