

# Ethnopharmacological survey on the consumption of the Association of Medicinal Plants-Koutoukou in the city of Abidjan (Ivory Coast).

## Abstract:

**Aims:** The purpose of this study is to identify the medicinal plants used in the bistros and to determine the preference between the consumption of Koutoukou alone or the Koutoukou mixture associated with medicinal plants in the city of Abidjan.

**Place and Duration:** Pharmacodynamic Biochemical Laboratory, Faculty of Biosciences, University of Félix Houphouët-Boigny, between December 2017 and June 2018.

**Methodology:** The investigation took place in the neighborhoods of Abobo, Cocody, Koumassi and Yopougon. This is an open-ended questionnaire intended for consumers of Koutoukou alone and the association medicinal Plants-Koutoukou. The identity, the region, the marital and professional status of the consumers on the one hand, the ethnobotany of the medicinal plants used and their associations with Koutoukou on the other hand were taken into account.

**Results:** This study identified 12 species of medicinal plants commonly used in bistros. 70% of the surveyed population prefer and consume more cocktails at the expense of simple koutoukou. The *Garcinia kola*-Koutoukou combination is the most significantly consumed cocktail (Number of treated illnesses greater than 10).

**Conclusion:** This descriptive study resulted in the identification of 12 medicinal plants commonly used in the bistros of 4 Commune of the city of Abidjan and consumed in association with Koutoukou. The populations of these municipalities (70%) prefer more associations plants-koutoukou. the association *Garcinia kola*-Koutoukou that allows the most healing is the most consumed.

**Keywords:** *Abidjan, Ethnopharmacology, Bistros, Koutoukou, Medicinal plants.*

## 1. INTRODUCTION

Medicinal plants are an important source of drugs for health care around the world, and global demand is growing [1]. About 22,000 medicinal plants identified by the World Health Organization (WHO) in 2003 [2] are used in traditional medicine. These plants are the subject of research in several fields including pharmacology, pharmacognosy, phytochemistry, etc. [3]. In most Third World countries such as Côte d'Ivoire, the practice of traditional medicine continues from generation to generation. According to the regions, it differs by adapting itself to the tradition by the association of certain substances whose artisanal eaux-de-vie such as Koutoukou. Koutoukou is a drink from the distillation of sweetened juices, including fermented palm oil sap (*Elaeis guineensis* Jacq.).

This drink appears to be more harmful than other so-called industrial alcoholic beverages because of its high concentration of butanol, methanol and even iron residues [4]. The work of Camara, 2002; Diboh, 2015 and 2014; Yao, 2009 [5, 6-7, 8], showed that regular and acute intake of this beverage could have very pronounced effects on alertness and epileptogenicity. If Koutoukou taken alone has harmful effects on the health of populations, can the association medicinal plants-koutoukou have beneficial effects on the health of consumers?

This study proposes to carry out an ethno-pharmacological survey on the consumption of the association of medicinal plants-koutoukou in four communes of the city of Abidjan (ABOBO, COCODY, KOUMASSI and YOPOUGON). It will list the medicinal plants used in koutoukou sales places called bistros, define the preference between the cocktail and simple koutoukou, and determine the most popular cocktail depending on the number of diseases treated.

## 2. MATERIELS AND METHODS

### 2.1. Framework of study

The ethno-pharmacological survey was conducted in the city of Abidjan. Abidjan, is a city of 422 km<sup>2</sup> with a population of 3.9 million (20% of the population of Côte d'Ivoire which is 19.3 million inhabitants).

It is the 7th most populous city in Africa after Cairo, Lagos, Kinshasa, Khartoum, Lunda and Alexandria and the 2nd largest French-speaking city in the world after Kinshasa (9.4 million) and before Paris (2.2 million inhabitants). Indeed, Abidjan, the Ivorian economic capital nicknamed "the pearl of lagoons" has 10 municipalities including ABOBO, COCODY, KOUMASSI, YOPOUGON and is considered as the cultural crossroads West Africa.

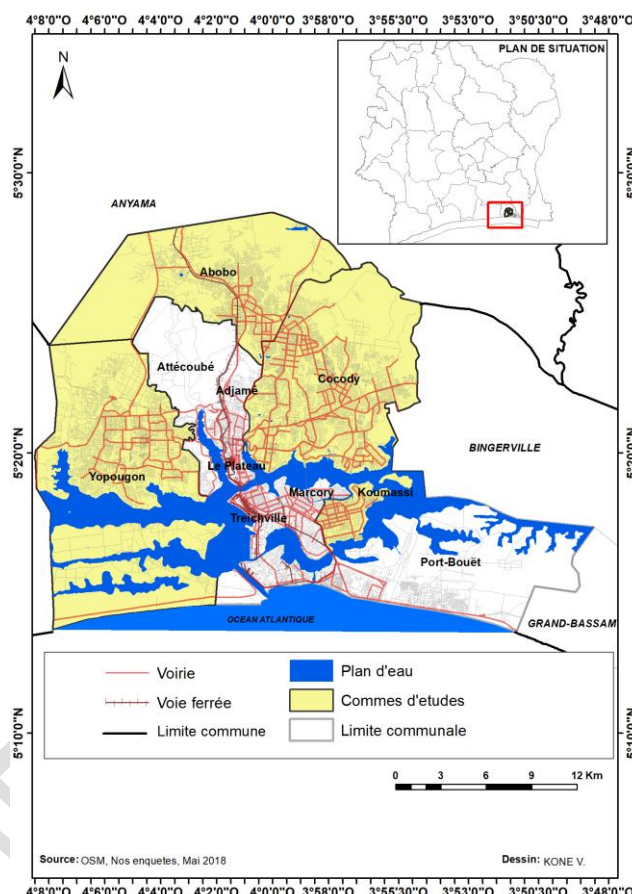


Figure 1: Map of the city of Abidjan

### 2-2-Materials

The technical material consists essentially of a simple and precise questionnaire, a Computer and software acquisition and data processing (Excel and R).

### 2-3- Methods

The prospective study consisted of conducting an ethno-pharmacological survey in four (4) communes of the city of Abidjan namely: Abobo, Cocody, Koumassi, and Yopougon. These communes were chosen on the basis of their accessibility, the large number of bistros and the high rate of low-income people residing there. The survey was conducted using open-ended questionnaires for consumers of this artisanal brandy. The study is characterized by the socio demography of the consumers (Identity, region, marital situation, professional situation), the ethnobotany of the plants and their associations.

*NB: Koutoukou, derived from the oil palm sap (Elaeis guineensis) or sugar cane juice or yeast-sugar-water mixture, is a high-titre brandy [9]*

*Bistros: main place of sale of koutoukou.*

## 2-4- Statistical Analysis

The data collected during this survey were processed using EXCELL and R software, which allowed us to determine the preference between Koutoukou supplemented with plants (cocktails) or Koutoukou simple, to list the most used plants in the association koutoukou-medicinal plants and finally to determine the most popular cocktail.

## 3-RESULTS AND DISCUSSION

### 3-1-Plants identified

The plants identified during the ethno-pharmacological survey in the bistrots are generally prepared in the form of maceration with Koutoukou and then administered orally. Table I presents the results of the census of plants used in macerations with koutoukou in the four communes of Abidjan. A total of twelve (12) plants were recorded in the four (04) communes of Abidjan. In the commune of Abobo, all twelve plants are used, while seven (07) of these plants (*Garcinia Kola*, *Enantia polycarpa*, *Xylopia ethiopica*, *Zingiber officinale*, Bitter Red (Unknown), *Moringa olifeira* and 4H (Unknown)) are used in only three communes (Cocody, Koumassi and Yopougon) in addition to the municipality of Abobo. Five (05) of these plants (*Siaguéhi* (Unknown), *Cocos nucifera*, *Tectona grandis*, *Citrus limon* and *Elymus repens*) are only used in the commune of Abobo.

**Table 1: List of plants identified and used in the cocktail by communes**

PLANTS		COMMUNES				
Vernacular names	Scientific names	Abobo	Cocody	Koumassi	Yopougon	total
Petit kola	<i>Garcinia Kola</i>	x	x	x	x	4
Jaune amer	<i>Enantia polycarpa</i>	x	x	x	x	4
Poivre africain	<i>Xylopia aethiopica</i>	x	x	x	x	4
Gnamakou	<i>Zingiber officinale</i>	x	x	x	x	4
Rouge Amer	Inconnu	x	x	x	4	4
Moringa	<i>Moringa olifeira</i>	x	x	x	x	4
4H	Inconnu	x	x	x	x	4
Siaguéhi	Inconnu	x	0	0	0	1
Coco	<i>Cocos nucifera</i>	x	0	0	0	1
Tek	<i>Tectona grandis</i>	x	0	0	0	1
Citron	<i>Citrus limon</i>	x	0	0	0	1
Chient dent	<i>Elymus repens</i>	x	0	0	0	0
Total	12	12	12	7	7	-

Absent: 0

Present: x

### 3.2- Preference between the consumption of Cocktail (Medicinal Plants- Koutoukou) and Koutoukou alone

The results of Figure 2 show the preference in consumption between Cocktail (medicinal plant mixture -Koutoukou) and Koutoukou alone.

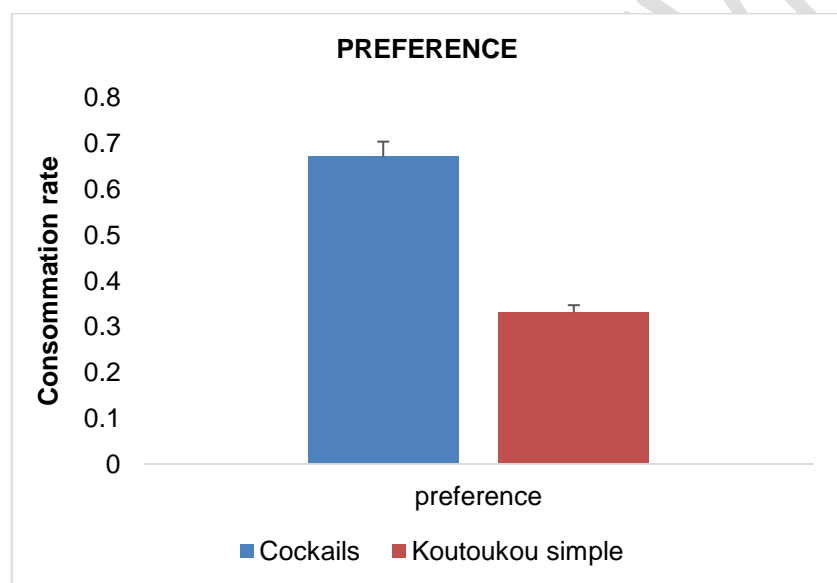
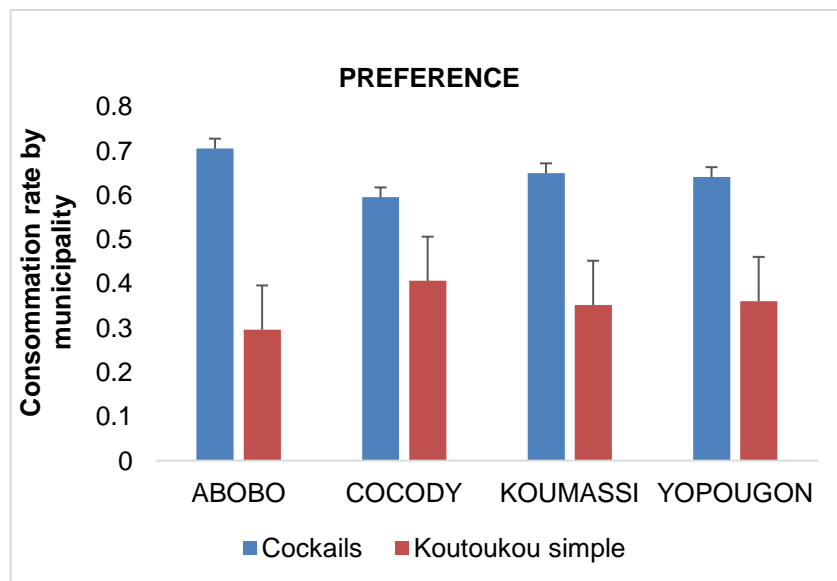


Figure 2: Consumption rate per commune between the cocktail (Koutoukou-medicinal plant mixture) and koutoukou alone

116

117

Table II: List of medicinal plants used in the cocktail according to the treated disease

PLANTS		DESEASES											total
Vernacular names	Scientific names	Malaria	Sexual weakness	Sore throat	Hemorroid	Sexual stimulant	cough	Aperitif	Typhoid fever	Diarrhea	Belly wood	Tiredness	
Petit kola	<i>Garcinia Kola</i>	x	x	x	x	x	x	x	x	x	x	x	11 a
Jaune amer	<i>Enantia polycarpa</i>	x	0	0	0	0	0	x	0	0	x	0	3 b
Poivre africain	<i>Xylopia aethiopica</i>	0	0	x	0	0	0	x	0	0	0	x	3 b
Gnamakou	<i>Zingiber officinale</i>	0	x	x		0	x	x	0	0	0	0	4 b
Rouge Amer Inconnu		0	x	0	0	0	0	x	0	x	x	0	3 b
Moringa	<i>Moringa oliferea</i>	x	0	x	0	x	0	x	x	x	x	x	8 a
4H	inconnu	0	x	0	0	x	0	x	0	0	0	0	4 b
Siaguéhi	inconnu		x	0	0	x	0	x	0	0	0	0	3 b
Coco	<i>Cocos nucifera</i>	0	0	0	0	x	0	x	x	0	x	0	4 b
Tek	<i>Tectonia grandis</i>	x	0	0	0	0	0	x	x	0	0	x	4 b
Citron	<i>Citrus limon</i>	x	0	0	0	0	0	x	x	0	0	x	4 b
Chient dent	<i>Elymus repens</i>	X	0	0	0	0	0	x	x	0	0	0	3 b

118 Binomial non-parametric test of samples in pairs ( $p \leq 0.05$ ); NB: alphabetical letters (a different from b)

Plants	Petit kola	Jaune amer	Poivre africain	Gnamakou	Rouge Amer	Moringa	4H	Siaguéhi	Tek	Citron	Chient dent	Coco
Number of diseases traited	++++	+	+	++	+	+++	++	+	++	++	+	++

119

120  $\leq 3$  correspond to : + ;  $3 \leq$  Number of diseases traited  $\leq 8$  correspond to : ++ ; Number of diseases traited  $\geq 8$  correspond to : ++++

### 3.3. Discussion

In Côte d'Ivoire, as everywhere else in Africa, the use of medicinal plants is attracting ever-increasing interest because of the richness of our medicinal plant flora, but also because of the growing poverty of the populations and by tradition. Researchers from these countries through ethnobotany and ethnopharmacology surveys are working to identify reputedly active plants, in order to determine by chemical, biochemical, etc. studies the components contained in these plants.

In this context, we carried out an ethnopharmacological survey in the bistros to identify the medicinal plants that are consumed there, to define the forms of use and if possible the pathologies that they were likely to treat.

Thus, a total of twelve (12) species of medicinal plants from eight families (Guttiferae, Annonaceae, Verbenaceae, Rutaceae, Moringaceae, Arecaceae, Poaceae and Zingiberaceae) have been recorded. These different species of plants are mostly prepared by maceration with koutoukou for 24 hours and then consumed orally. Thus 3 plants including *Garcinia kola* (Guttiferae), *Enantia polycarpa* (Annonaceae), *Zingiber officinale* (Zingiberaceae) were the most used. Our results corroborate those of Hong-xi and Song (2001); Tita et al., (2001) [10,11]. According to these authors, these plant families are increasingly used in traditional African medicine. The World Health Organization estimates that more than 4 billion people around the world use medicinal plants for their health problem. Plants, it must be remembered, are also invaluable resources for the pharmaceutical industry [12].

Indeed, more than 20,000 to 25,000 plants are used in the pharmacopoeia and more than 50% of the pharmaceuticals available on the market are of natural origin [1]. The low use of other families (Verbenaceae, Rutaceae, Moringaceae, Arecaceae, Poaceae) of plants could be explained by a lack of knowledge of their properties in the area surveyed. Thus, an ethnobotanical survey conducted by Ladoh-Yemeda and al., 2016 [13], revealed in Cameroon a low frequency of citation of some families whose verbenaceae ranged between 0.04 and 0.19% at the expense of the frequency of citation of the announced family which was 0.70%. The ethnopharmacological survey carried out in the 4 communes (Abobo, Cocody, Koumassi, Yopougon) of the city of Abidjan made it possible to highlight a preference of the population in the consumption of simple koutoukou and the association medicinal plants - Koutoukou (Cocktail). In the commune of Abobo, 70% of the people surveyed prefer the cocktail at the expense of simple koutoukou. In the other communes of Cocody, Koumassi and Yopougon, 60%, 65% and 64% respectively of the surveyed population prefer the cocktail to the detriment of simple koutoukou. In total, the association medicinal plants - koutoukou is the most consumed because about 70% of the surveyed population prefer it to simple Koutoukou. This fact would be explained by socio-cultural habits and or a low income of the population a presumption of healing that gives the population to these different cocktails.

Indeed, according to Hamon and al., (2002) [14] the use of artisanal beverages obtained from palm wine, sugar cane juice and sugar water with yeast has since become permanent on the occasion of ancestor worship ceremonies, funerals and weddings. Hamon and Camara (1995) [9], also indicated that because of their low cost of production and sale, traditional alcoholic beverages (dolo, palm wine and Koutoukou) are increasingly consumed but they would not replace manufactured and / or imported beverages. In the encyclopedia of medicinal plants [15], decoction, infusion and maceration constitute the essential preparation and use recommended in traditional therapies. In addition, the recipes combined can contain biological supplements, of vegetable nature (dates, drinks, ...), animal (milk, honey) or even mineral (rock salt), intended to reduce the irritating nature or annihilate the toxic effect of a component or on the contrary enhance its activity either to enhance the curative effects of the various constituents in order to achieve a therapeutic synergy [16].

Our consumer survey of koutoukou associated with medicinal plants in bistros, revealed that these cocktails would cure some diseases such as malaria, sexual weakness, sore throat, hemorrhoids, sexual stimulant, cough, fever typhoid, diarrhea, belly sores. The preference of these cocktails was related to the number of illnesses that these would cure. Thus, the association small cola (*Garcinia kola*) - koutoukou was designated as the most preferred cocktail taking into account the number of cured diseases. Then come the bitter yellow associations (*Enantia polycarpa*) - Koutoukou or African pepper (*Xylopia aethiopica*) - Koutoukou. The most common selection criterion is the repetition of vernacular use and its invariance in as wide a geographical area as possible [17].

*Garcinia kola* is a widely studied medicinal plant. Thus according to the works of Farombi and al., 2002 [18] ; *Garcinia kola* has hypoglycemic, antioxidant, antibacterial, anti-hepatotoxic properties etc that would be the cause of its effects.

#### 4. CONCLUSION

This study identified twelve (12) medicinal plants from 8 families, used in the koutoukou sales places called bistros. The surveyed population prefers and consumes more the association koutoukou-medicinal plants to the detriment of simple koutoukou for several reasons including the presumption of cure. Thus, the cocktail koutoukou-Garcinia kola (Guttiferae), is the most popular because of the multiplicity of diseases that it would cure.

#### COMPETING INTERESTS

Authors have declared that no competing interest exist

#### AUTHOR'S CONTRIBUTION

All authors read and approved the final manuscript

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