

Full Length Research Paper

Investigating on related diabetes therapeutic plants used in traditional medicine at Brazzaville

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A survey on related diabetes therapeutic plants used in traditional medicine was held from July 2008 to March 2010, in a population of tradi-practicians and sellers in the 7 districts of Brazzaville. According to our ethno pharmacologic protocol, two types of tradi-practicians were selected: those which are identified by the Ministry of health and organized in centers and those which are not identified by the Ministry of Health. The survey provided information about work organization, knowledge about diabetes, plant or the protocol, administration way of the product, duration of the treatment, secondary effects during the treatment, method of evaluating treatment, precautions to take during treatment and for all life, life level of the patients, and others disease which can be treated by the same plant. Most of the plants used were grouped and their diabetic effects were given. The results can be used as a basis for related diabetes therapeutic plants in Congo.

Key words: Diabetes, tradi-practicians, ethno pharmacologic, anti diabetic.

INTRODUCTION

Diabetes is a metabolic chronic affection caused by a defected regulation of mechanism in the use of glucose by organism. Considered in the past as an affection of developed countries, nowadays perspectives progression are alarming for diabetes even in developing countries. Now diabetes has become a public health problem, and the prevalence of diabetes in developing countries is between 20 and 30% (Grimaldi et al., 1997). According to World Health Organization (WHO), the prevalence of diabetes has grown in about 35% (King et al., 1998) in 2002, WHO estimated this population at about 180 millions (OMS. Aide memoire, No. 138, revised 18 April, 2002). Recently, Boyle et al. (2010) predicted that the world diabetic population will reach 300 millions or more

around 2025. The precarity of the economic and social context are increasing the gravity of the disease in Republic of Congo, where the small bottle of insulin costs 28 Euros and a type 1 diabetic patient use from one to two bottles a month, while the minimum salary (SMIG) is 78 Euros. Because of the disease constraints, many patients are obliged to use traditional medicine to cure the disease. In its resolution AFR/RC 50/R3 of 31 August 2000, WHO encouraged African countries to elaborate sub-regional strategies in traditional medicine, enhancing researches in medicinal plants to promote optimal use in the health area. In this respect, nowadays, great research projects in the field of ethno pharmacology are going on, in almost all African universities. If African traditional medicine has proved its capability to cure infectious disease, this has not been proved for the treatment of viral and metabolic disease like diabetes. In this work, we evaluate the level of Congolese tradi-practicians about

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the knowledge of diabetes, list the anti-diabetic plants used by Congolese tradi-practicians and propose a protocol for valorization of our traditional medicine.

MATERIALS AND METHODS

Area and duration of the study

An ethno pharmacologic study has been hold from July 2008 to March 2010, in a population of tradi- practicians and sellers of plants. The Seven (Carpentier et al., 1995) districts of Brazzaville were concerned. Brazzaville has been chosen for this study, because of the presence of almost ethnic groups which lives there.

Ethno pharmacologic protocol

Two types of tradi-practicians were surveyed; tradi-practicians were identified by the Ministry of Health, and working in the organized centers. Six centers are identified by the Ministry of health: among 4 centers in the evangelic church (protestant church), 1 center in the district No. 3 (Poto-poto), 1 center in the district No. 6 Hospital (Talangaï). These tradi-practicians are legally installed by the administrative note of medicine traditional Direction of the Ministry of health. For each center, each tradi-practician is in charge of a number of patients.

Tradi-practicians working themselves were not identified by the Ministry of health, thus survey was very difficult to them. These tradi-practicians are of the opinion that the traditional inheritance belongs to the family members, and cannot be given to anybody, because most people will use the knowledge for their own financial benefit. Some think that the scientific research will lead to a state decision in which they do not have any advantage. In this case, we had to give money or use other human relation to get the name of the plant and the protocol of usage.

The document of the survey collected information about work organization (in group or alone), knowledge on diabetes (name of the disease in a Congolese language, the causes and symptoms), how the plant was found or the protocol (used solvent, duration of the protocol maceration, decoction or infusion), how to administer the product and the way, the duration of the treatment, secondary effects during the treatment, the method of evaluating treatment, precautions to take during treatment and for life, life level of the patients (studying level, professional activity), other diseases which can be treated by the same plant.

All the collected plants were kept in the herbarium in the PM2 room of Department of Cellular and Molecular Biology of the Faculty of Science, University Marien NGOUABI. The plants names were given in a Congolese language with the contribution of botanist and systematist, Nkounkou Jean Sérina of Department of Plant Biology and Physiology of the Faculty of Science, Scientific names were given. The manuals d'Adjanohoun (Adjanohoun et al., 1998) and Bouquet (Bouquet, 1969) have been of a great help in this job.

Surveyed population

The ethno pharmacologic survey was carried out on 44 persons, including 19 tradi-practicians, all men, 21 sellers (3 sellers per district, among 9 men and 12 women) and 4 independent users. The age of the surveyed population was between 25 and 52 years old; selling different mixtures (anti diabetic, antibiotic, anti-malaria) is the most important activity which generates funds. Six State

workers which have monthly salary have been surveyed among the tradi-practicians. The rest of 44 persons (86.36%) depend solely on the aforementioned activity as means of livelihood. Prices of plants can be negotiated between sellers and buyers, for majority of sellers plants can be bought very cheap. The sellers explain to the buyers how to prepare the product from the plant (protocol used) and the posology, while in the centers, the plants are collected by the tradi-practician himself, and only sells the product of the plant to be use for treatment to the patients.

Only a few tradi-practicians agreed to know the plant through another tradi-practician, a patient, or a book. Most of tradi-practicians for the center of the church, said that plants were revealed by God, by dream, or a by an ancestor. This last category of tradi-practicians thinks that, if the product of the plant is not given by them, it has no effect on the patient.

RESULTS

Some ethnic groups in Congo

Figure 1 shows the distribution of some ethnic groups in Congo. There are many ethnic groups in Congo, we have mentioned some just to show the diversity.

Grouped plants and medico-traditional use

In this study, we collected 37 species of plants separated in 36 genera and 28 families (Table 1). The most represented families are the Rubiaceae (5 espèces), the Euphorbiaceae (3 espèces), the Bombacaceae (2 espèces), and the Asteraceae (2 espèces).

Using a bibliographic study, we classified the 37 plants related to our survey into five ethno pharmacologic groups:

Group 1

Group 1 consists of plants whose hypoglycaemic activity has been tested with laboratory animals. These include:

Anacardium occidentale: From the study of Kamtchouing et al. (1998), when the rats are made diabetic by streptozotocine are treated with 175 mg/kg of aqueous extract of this plant, it gives a less important peak of glycaemia than the peak of rats which are not treated this extract (123.50 ± 6.85 for the treated rats against 252.80 ± 35.59 for the non treated rats). Moreover, the treated rats have no signs of polyphagy and polydipsy when compared to the control non treated rats. The experiments of Kamtchouing were confirmed by the experiments of Tedong et al. (2007).

Catharanthus roseus: Sing et al. (2001) showed in 2001 that the extract of this plant has antidiabetic effect on rats which have become diabetic by the injection of the streptozotocine.

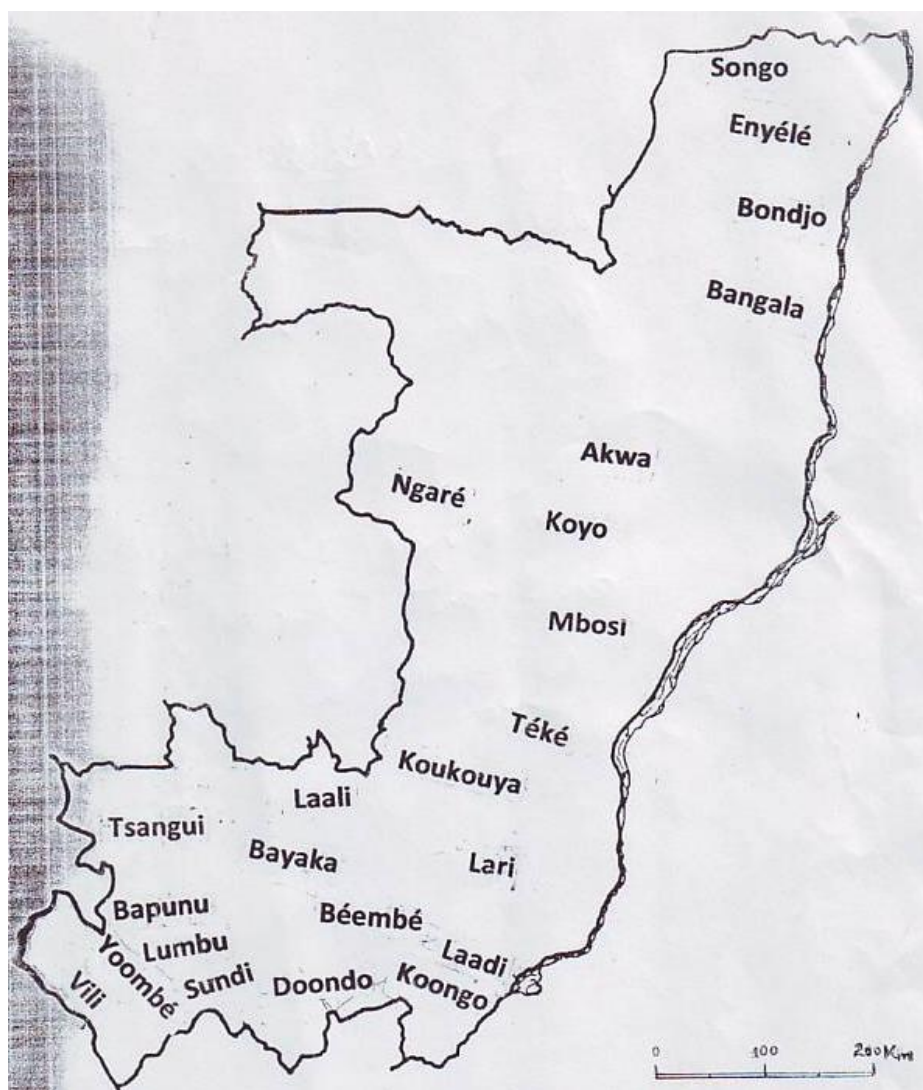


Figure 1. Distribution of some ethnic groups in Congo. There are many ethnic groups in Congo, we have mentioned some just to show the diversity.

***Bridelia ferruginea*:** The work of d' Addae-mensah and Munnenge (1989) has shown that the quercetine-3 neohes-periodoside and others flavonoids extracts of this plant have hypoglycaemic activity on rats.

***Cogniauxia podolaena*:** Leaves extracts of this plant have antidiabetic characteristics on rats as revealed by the thesis of Badila (2003); Badila's work also revealed a toxic activity of these extracts on the liver.

***Momordica charantia*:** The researches of Srivastava in 1993 revealed that the extracts of this plant has antidiabetic activity.

***Ceiba pentandra*:** In 2003, Olusola demonstrated proof of hypoglycaemic (hypoglycemic) effect of the aqueous

extract of this plant on induced-streptozotocin diabetes rats (Olusola et al., 2003). Djomeni-Dzeufiet confirmed this effect in working with rats which have non insulin-dependant diabetes (Djomeni-Dzeufiet et al., 2006).

***Musa sapientum*:** Aqueous extracts of this plant have hypoglycaemic effect according to the work of Pari in 1999 on induced-alloxane diabetes rats (Pari and Uma Maheswari, 1999).

***Scoparia dulcis*:** The hypoglycaemic activity of this plant has been demonstrated by Pari in 2002 on induced-alloxane diabetes rats (Pari and Venkateswaran, 2002).

***Psidium guajava*:** Many experiments are confirming the hypoglycaemic and antidiabetic activities of this plant on

Table 1. List of plants and medico-traditional use of each plant.

| No. | Family | Scientific name | Local name (Congolese language) | Used part | Form used | Frequency | Other medico-traditional use |
|-----|----------------|-------------------------------|---|--------------------------|-------------------------|-----------|--|
| 1 | Anacardiaceae | <i>Anacardium occidentale</i> | Ngasahu (Lumbu) Mbuma liboto (Bangala) | Ecorces | Maceration decoction | 2 | Gastralgia, reproduction, high blood pressure |
| 2 | Apocynaceae | <i>Catharanthus roseus</i> | | Roots, leaves | Decoction | 5 | Cancer, diarrhea, high blood pressure, headache |
| 3 | Annonaceae | <i>Annona senegalensis</i> | Moulolo (Kongo) Nlolo (Laadi) Ololo (Mbochi) Tchilolo (Vili) | Leaves, ecorces, seed | Decoction | 1 | Toothache fever, asthma, bronchite, anxiety, dysentery, constipation, high blood pressure, rheumatism, belly problems, insecticide, antifungal, antalgic, antibacterial, anti-inflammatory, female infertility |
| 4 | Asteraceae | <i>Ageratum conyzoides</i> | Eyouo (Téké) | All the plant | Decoction | 2 | Constipation, otitis malaria, high blood pressure, fever, anticonvulsive |
| | | <i>Eclipta prostrata</i> | Oyindissa (Mbochi) Ohissa (Akwa) | Leaves | Decoction | 2 | Healing cicatrising, tinter, ink, hemorrhoids, fontanelle |
| 5 | Bombacaceae | <i>Adansonia digitata</i> | Moufouma (Kongo) Omfouma (Téké) | Ecorces Leaves | Decoction | 2 | High blood pressure |
| | | <i>Ceiba pentandra</i> | Nfuma (Kongo) Omfima (Téké) Okouma (Mbochi) Vuma (Vili) | Ecorces | Decoction | | High blood pressure, diarrhea |
| 6 | Burseraceae | <i>Dacryodes edulis</i> | Ossa ou sao (Akwa) Nsafu (Lari) Otsaré (Kôyô) Mfiéla (Sundi) | Leaves | Decoction | 2 | High blood pressure, stomach |
| 7 | Cesalpiniaceae | <i>Cassia occidentalis</i> | Ondziégué (Akwa) Nkéantali (Koukouya) Nkrantali (Téké) Zangoulou (Sundi) | Leaves | Decoction | 2 | Lumbago, snake bite diarrhea, belly aches |

Table 1. Contd.

| No. | Family | Scientific name | Local name (Congolese language) | Used part | Form used | Frequency | Other medico-traditional use |
|-----|----------------|---------------------------------|--|---------------|-----------|-----------|--|
| 8 | Chenopodiaceae | <i>Chenopodium ambrosioides</i> | Tsu la nvumu (Téké) Diamba dambata (Kongo) Djakumba (Mbochi, Kôyô) Owoulouwoussou (Akwa) Lukaya lua mukuyu (Sundi) | All the plant | Decoction | 2 | Dermatosis, worms, asthma, measles |
| 9 | Combretaceae | <i>Combretum racemosum</i> | Mususumbi (Kongo) Mutsumbi (Laali) Otsienga (Mbochi) | Leaves | Decoction | | Dysentery |
| 10 | Cucurbitaceae | <i>Cogniauxia podolaena</i> | Mubamama (Téké) Ombama (Mbochi) Nkosia (Laadi) Okio béku (Akwa) | Leaves | Decoction | 2 | Scrotum elephantiasis, blennorrhage, stomach ache |
| | | <i>Momordica charantia</i> | Lumbuzi-busi (Mbéembé) Mabumbulu (Doondo) Tsuirilunfu (Téké) Lumbuji (Lari) | Leaves | Decoction | 4 | Febrile aches, belly aches |
| 11 | Ebenaceae | <i>Diospyros heterotricha</i> | Mulolo kongolo (Kongo) Nzété ya mino (Lingala) | Ecorces | Decoction | 1 | Kidney aches sexual weakness, constipation, food contamination, oedema |
| 12 | Euphorbiaceae | <i>Bridelia ferruginea</i> | Idu ou otéyé (Mbochi) Ekilikuma (Akwa) Kolokoto tsia makanga (Lari) Kimouindou (Yoombé) Eloua, ékani (kôyô) | Leaves | Decoction | 5 | Fever, oedema, diarrhea |
| | | <i>Phyllanthus amarus</i> | Moundziéké ndzéké (Kongo) Ndiango (Téké) Oka apoko (KôYô) Moundziri (Laali) Ebandatchi (Mbochi) | Leaves | Decoction | 3 | High blood pressure, blennorrhage, female sterility, diarrhea |

Table 1. Contd.

| No. | Family | Scientific name | Local name (Congolese language) | Used part | Form used | Frequency | Other medico-traditional use |
|-----|---------------|-----------------------------------|---|-------------------|-----------|-----------|--|
| 12 | Euphorbiaceae | <i>Sapium cornutum</i> | Mukagni (Laali) Ntiiti ou mutiiti (Laadi) Mukagni (Laali) Eyondo (Akwa) | Ecorces | Decoction | 1 | It favors an easy delivery |
| 13 | Fabaceae | <i>Abrus precatorius</i> | Ikeni (Kôyô) Djekiri (Enyéle) Mudjiri (Laali) Nfigu (Vili) Ngyéngyé (Laadi) Nguiéguié (Lari) Makomakoma (Kongo) | Leaves | Decoction | 1 | High blood pressure, cough fortifying, aphrodisiac, anti-convulsive, asthenia |
| 14 | Haemodoraceae | <i>Sanseveria trifasciata</i> | Limelangue (Mbochi) Mbama (Téké) Ilanga (Kôyô, Akwa) Ngongolo (Enyéle) Mboma (Bondjo) | Leaves | Decoction | 1 | Belly problems, contamination madness, inflammation, rheumatism, varicellis, expel evil influences snakes and lighting |
| 15 | Hypericaceae | <i>Harungana madagascariensis</i> | Ekongo (Kôyô) Moussassa (Tsangui) Ontin-npô (Téké) Ntounou (Laadi) Ombimbélé (Mbochi, Akwa) | Ecorces Leaves | Decoction | 4 | 'Ovulation troubles, fever, menses troubles, itching, head stain disease dermatosis, Dysentery, expectorant, vomiting |
| 16 | Lauraceae | <i>Persea americana</i> | Saboka (Akwa) Moussavouma (Téké) | Ecorces | Decoction | 3 | Diarrhea, cough, massage in case of sympathetic magic |
| 17 | Limiaceae | <i>Ocimum gratissimum</i> | Mantsusu ma fyoti (Lari) Ndoundoumba (Akwa) Mansusu, ampiri (Téké) Douma douma (Kôyô) | Leaves | Decoction | 3 | Cough, gonorrhoea, chronic dysentery |
| 18 | Mimosaceae | <i>Entada gigas</i> | Lempfuru (Mbochi) Mokondo (Kôyô) | Tige | Decoction | 1 | Belly problems |

Table 1. Contd.

| No. | Family | Scientific name | Local name (Congoese language) | Used part | Form used | Frequency | Other medico-traditional use |
|-----|-----------|------------------------------------|---|--------------------|-------------------------|-----------|--|
| 19 | Moraceae | <i>Trilepisium madagascariense</i> | Museginyi (Bapunu, Bazabi) Mouwili (Koukouya) Musékéni ou nsékéni (Lari) Mofongi (Bayaka) Litari (Téké) | Leaves | Decoction | 2 | High blood pressure, anemia, diarrhea, healing cicatrising, reinvigorating, blennoragy, rheumatism, ophtalmic, belly problems. |
| 20 | Musaceae | <i>Musa sapientum</i> | Kô (Téké) Likemba (Lingala) | Leaves | Decoction | 1 | Goitre, to wrap for cooking cassava |
| 21 | Myrtaceae | <i>Psidium guajava</i> | Anguiéfou (Téké) | Leaves | Decoction | 3 | High blood pressure, diarrhea, dermatosis, fever, hemorrhoids |
| 22 | Ochnaceae | <i>Ouratea affinis</i> | Loubanzi-loua-mpakassa (Kongo, Laadi) | Leaves | Decoction | 1 | Aphrodisiac |
| 23 | Rubiaceae | <i>Craterispermum laurinum</i> | Sakadiankanta (Kongo) Okoua (Ngaré) Ontentê (Téké) | Ecorces | Decoction Maceration | 2 | An anti-parasitary product, belly problems |
| | | <i>Mitagyna stipulosa</i> | Moulongoua (Kongo, Lari, Soundi) | Ecorces | Decoction | 2 | Urinary antiseptic, female sterility, anemia |
| | | <i>Morinda lucida</i> | Moussiki ou nsiki (Laadi, Laali) Ossii (Mbochi) Onchou(Téké) Ossika(Akwa) | Leaves, Ecorces | Decoction | 5 | Genito urinary infections, high blood pressure, hernia, female sterility |
| | | <i>Morinda morindoides</i> | Kongo bololo(Laadi) Kongo bouroulou(Vili) Eloloba (Songo) Mutunfi (béembé) | Roots | Decoction | 4 | Worm expeller, itching wounds, urinary infections |
| | | <i>Nauclea latifolia</i> | Tsienga (Kongo) Mabouobouo (Téké) Kienga (Yombè) | Roots | Decoction | 5 | Worms expeller, diarrhea, diurétic, blennoragia, |

Table 1. Contd.

| No. | Family | Scientific name | Local name (Congolese language) | Used part | Form used | Frequency | Other medico-traditional use |
|-----|------------------|----------------------------|--|----------------|-----------|-----------|---|
| 24 | Sapindaceae | <i>Paullinia pinnata</i> | Béléwoko (Bondjo) Lokukakambo (Songo) | Ecorces | Decoction | 1 | Fortifying, diarrhea, anti-hémorragic, anti-oxydant, |
| 25 | Scrophulariaceae | <i>Scoparia dulcis</i> | Mulombo (Laadi) Oyê (Mbochi) Ginge (Téké) | All the plants | Decoction | 1 | Expell evil influences, love attraction |
| 26 | Simaroubaceae | <i>Quassia africana</i> | Moupepsi (Kongo, Lari) Simbikali (Vili) Otapa (Mbochi) Ndoulè ndoulè (Yombè) Okoungou (Akwa) Mounkankala (Téké) | Roots | Decoction | 2 | Against fever, stomachache hernia, worms expeller, broncho-pulmonary affections, healing cicatrising, rheumatism, pedicle killer, malaria |
| 27 | Solanaceae | <i>Phaseolus lunatus</i> | Madéesso (Kongo) Mankoundou (Béembé) | Gousse, roots | Decoction | 1 | Otitis, headache |
| 28 | Zingibéraceae | <i>Zingiber officinale</i> | Tangawissi (Laadi) Moungousti-mbala (Béembé) | Roots | Decoction | 4 | Hemorrhoids, cough, belly aches |

Catharanthus roseus, the kaempferol and/or the quercetol has been isolated from *Ceiba pentandra*.

Group 3

The plants used in traditional medicine in other countries and which antidiabetic activities, have been proved by patients' testimonies. In Cameroun, the researches of Tabang et al. (2001), investigating on anti-diabetic plants in Yaoundé and around, and those of Nkongmeneck et al. (2000), in the study of search for ways of diabetes therapy and plants used by diabetic patients in Cameroon

have revealed the use of many plants, with the traditional preparation mode and posology. Among these plants are those we have used in our survey. They are: *Ageratum conizoides*, *Persea americana*, *Phyllanthus amarus*, *Morinda morindoides*, *Annona senegalensis*, *Nauclea latifolia*, *Catharanthus roseus*, *Morinda lucida*, *Bridelia ferruginea*, *Cassia occidentalis*.

In Ivory Coast, Fezan et al. (2008) found 19 antidiabetic plants, among them are: *Anacardium occidentale*, *C. roseus*, *A. conizoides*, *Eclipta prostrata*, *Adansonia digitata*, *Ceiba pentandra*, *Momordica charantia*, *Ocimum gratissimum*, *P. americana*, *Psidium guajava*, *N. latifolia*, *M. lucida*, which are cited in our survey.

Group 4

The plants which reducing glycaemy mechanism is known are *C. roseus* and *Bridelia ferruginea*, they can stimulate beta cells of pancreas (Bep, 1986) and *M. charantia* which has pancreatic action and peripheral action in glucose penetration (Srivastava et al., 1993).

Group 5

The plants on which the literature that we have accessed to, do not give the research on diabetes, but the literature gives information on other

affections. They include:

Dacryodes edulis, *Combretum racemosum*, *Sapium cornutum*, *Abrus precatorius*, *Sanseveria trifasciata*, *Entada gigas*, *Trilepisium madagascariense*, *Ouratea affinis*, *Craterispermum laurinum*, *Mitragyna stipulosa*, *Quassia africana* and *Phaseolus lunatus*.

The results of the survey give credible information on the use of these plants in diabetes treatment: the isolation of natural molecules that have hypoglycaemic and anti-hyperglycaemic effects. In fact, the mechanisms of the action of some plants are known and there are testimonies of diabetic patients who have used these plants.

According to the researches of Nkongmeneck already mentioned earlier, 8 diabetic patients among 23 which have used plants, claim that they need no other therapy for maintaining the normal limit of blood glucose concentrations. These plants are: *Morinda lucida* *Rauvolfia vomitoria*, *Solanum melongena*, *Cassia alata* and *Euphorbia hirta*.

Conclusion

The time is due in that African countries have to create an work environment which will contain tradi-practicians, fundamentalist researchers (biochemists, and chemists), pharmacians and medical doctors for the purpose of searching new natural anti-diabetic molecules, making rational the use of based-plants products and optimizing the using of traditional drugs.

The involvement of states and researchers is an emergency for two reasons:

The first is related to the toxicity of the plants which possesses anti-diabetic effect, the case of *C. podolaena* which the toxicity for liver has been demonstrated, while having an anti-diabetic effect. Moreover, when not well used an anti-diabetic plant will change the hyperglycaemia in a mortal hypoglycaemia.

The second reason is that synthetic anti-diabetic drugs usually regulate the blood glucose rate, and often do not have effect on the diabetes complications; consequently, one plant is a factory of many molecules the diversity in their biological composition. The results of this survey revealed that 12 plants on the 37 listed have an action against one or more of the diseases accompanying diabetes, high blood pressure. The treatment of diabetes through traditional medicine is a reality and not a spiritual view.

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