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An overview of anti-diabetic plants used in Gabon: Pharmacology and Toxicology

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Abstract

Ethnopharmacological relevance:

The management of diabetes mellitus management in African communities, especially in Gabon, is not well established as more than 60% of population rely on traditional treatments as primary healthcare. The aim of this review was to collect and present the scientific evidence for the use of medicinal plants that are in currect by Gabonese traditional healers to manage diabetes or hyperglycaemia based here on the pharmacological and toxicological profiles of plants with anti-diabetic activity are presented in order to promote their therapeutic value, ensure a safer use by population and provide some bases for further study on high potential plants reviewed.

Materials and methods:

Ethnobotanical studies were sourced using databases such as Online Wiley library, Pubmed, Google Scholar, PROTA, books and unpublished data including PhD and Master thesis, African and Asian journals. Keywords including 'Diabetes', 'Gabon', 'Toxicity', 'Constituents',

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"hyperglycemia' were used.

Results:

A total of 69 plants currently used in Gabon with potential anti-diabetic activity have been identified in the literature, all of which have been used in *in vivo* or *in vitro* studies. Most of the plants have been studied in human or animal models for their ability to reduce blood glucose, stimulate insulin secretion or inhibit carbohydrates enzymes. Active substances have been identified in 12 out of 69 plants outlined in this review, these include *Allium cepa* and *Tabernanthe iboga.* Only eight plants have their active substances tested for anti-diabetic activity and are suitables for further investigation. Toxicological data is scarce and is dose-related to the functional parameters of major organs such as kidney and liver.

Conclusion:

An in-depth understanding on the pharmacology and toxicology of Gabonese anti-diabetic plants is lacking yetthere is a great scope for new treatments. With further research, the use of Gabonese anti-diabetic plants is important to ensure the safety of the diabetic patients in Gabon.

Key words: Diabetes mellitus, Gabon, Medicinal Plants, Anti-diabetic activity, Toxicity.

Introduction

Diabetes is a chronic metabolic disorder where management is a global problem. Diabetes is forcasted to become one of the world's main disablers and killers in less than 25 years (Malviya et al., 2010). The total number of persons affected globally is projected to rise from 371 million

in 2011 to 552 million in 2030, if prevention measures are not scaled up (IDF, 2011). Gabon, a small country with a population of 1.7 million, is the third country in sub-Saharan Africa that is the most affected by diabetes mellitus, with a national prevalence of more than 9% (Ntyonga-Pono, 2015).

Many factors are responsible for the rise of diabetes in Gabon. These factors include urbanisation, lifestyle changes with high fat food and few physical activities, obesity and the fact that more people are being diagnosed. In urban areas, diabetes is well managed, and patients have easy access to medicines. However, the expensive cost of treatments and their poor availability, as well as, the culture and religious beliefs of the population are leading to patients relying more on traditional healers and medicinal plants for the management of diabetes, especially in rural areas (Ntyonga-Pono, 2015).

In Africa, even in Gabon, plant based traditional medicine is widespread. These plants are used to treat all type of common pains and diseases, including those that modern medicines deal with such as cancer, renal insufficiency (Yokozawa *et al.*, 2002), HIV (Helfer et al., 2014) and diabetes (Osabede et al., 2014). Several diabetes medicines used today have been developed or derived from plants that were once used in traditional medicine such as metformin, a biguanide derived from *Galega officinalis* L. (Fabaceae) (Osabede et al., 2014). Inversely, certain natural compounds from medicinal plants such as *Tabernanthe iboga* act like sulfonylureas, organic compounds that enhance insulin release from pancreatic beta cells (Souza et al., 2011).

Despite the World Health Organisation (WHO) recommendations, the reduced cost of herbal medicines and the easy access of plants (many plants are cultured in gardens or surrounding villages), a large number of reported medicinal plants in Gabon are used by the population

without any scientific supportive data (Osabede et al., 2014). Data which could represent a valuable source of information to limit toxicity-related issues, monitor plants and population safety and provide a good number of compounds for drug development in diabetes, are needed. Current therapies for diabetes including insulin and various oral antidiabetic agents such as sulphonylureas and biguanides have limitations including hypoglycaemia and weight gain (Panda et al., 2011; Gupta et al., 2016). Medicinal plants have previously been reported to be beneficial in hyperglycaemia control worldwide and have largely been used as anti-diabetic remedies (Patel et al., 2012). Anti- hyperglycaemic effects of plants claimed to be anti-diabetic have been mainly attributed to their ability to re-establish pancreatic tissues functions by increasing insulin production such as sulfonylureas, inhibiting glucose intestinal absorption such as acarbose an oligosaccharide, or increasing metabolism of insulin-dependent means (Kuete and Efferth, 2010; Talreja and Kaur, 2014).

Biodiversity and Ethnobotanical uses of medicinal plants in Gabon

Gabon is a country covered with more than 80% of forest, and many plants are traditionally used for the treatment of various diseases (Mengome *et al.*, 2009). Despite considerable progress in the management of several pathologies, including diabetes mellitus by conventional medicines, over 60% of Gabonese population is still dependent on plant remedies for economic and cultural reasons. In Gabon, rural areas are surrounded by wild vegetation, as Gabonese population density is low; people living in cities have easy access to domesticated or wild plants such as *Irvingia gabonensis* which is used as anti-inflammatory remedy (Vliet, 2014; Kuete et al., 2007). Medicinal plants use and knowledge have been mastered by traditional healers for a long time in

sub-Saharan Africa, including Gabon.

Ethnobotanical information indicates that more than 20 000 medicinal plants used for numerous pathologies (Iwu, 2014) are known in Africa while less than 1% of them have been scientifically investigated for their biological activities (Iwu, 2014). The use of medicinal plants is a cultural practice which represents the primary healthcare of 80% of the population of developing nations, including Gabon according to the World Health Organization (WHO) (Eyong, 2007; Swargiary *et al*, 2013).

In Gabon, more than 1600 medicinal plants have been reported (Vliet, 2012), however, little data is available in the literature. Among them, several herbs have shown their potential anti diabetic properties including *Irvingia gabonensis* (Odika or wild mango) (Hossain *et al.*, 2012), *Pseudospondias longifolia*, *Antrocaryon klaineanum* and *Tabernanthe iboga* (Mebale *et al.*, 2013; Souza et al., 2011).

The aim of this review was to collect and present the scientific evidences for the use of medicinal plants that are in currect use by Gabonese traditional healers to manage diabetes or hyperglycaemia based, and outline any known pharmacological, toxicological and safety profiles. This review therefore provides a valuable source of information and highlights scientific gaps in knowledge of Gabonese plants used in the management of diabetes.

Materials and methods

Relevant information on medicinal plants occurring in Gabon and traditionally used for the management of diabetes and / or hyperglycaemia were mostly obtained from ethnobotanical

studies. These studies were made in different regions of Gabon (Estuaire, Ogooué-Lolo, Haut-Ogooué) with traditional healers, and in local markets of the capital and largest city, Libreville, where one third of the Gabon population lives. Traditional healers or market saleswomen/ salesmen did not use the term 'Diabetes mellitus'. However, they easily described symptoms such as 'excessive urination with ants and flies gathering arount it', 'abnormally feeling thirsty', 'loosing weight', principally to diagnose the disease. Also, we selected published papers using databases such as Online wiley library, Pubmed, GoogleScholar, SciFinder, Sciences direct, Scopus, Pubchem using 'Diabetes', 'Gabon', 'Toxicity', 'Constituents' as main keywords. Other web sources such as the Plant List, Kew Botanical Garden, PROTA, African and Asian journals were also used alongside books, PhD and MSc dissertations and unpublished data. We shortlisted potential anti-diabetic plants found in the literature or not, which were acknowledged by traditional healers or saleswomen/ salesmen (vernacular name cited) in Gabon, with one or more experimental evidence (*in vivo* and /or *in vitro*) in animal models validating the anti-diabetic activity except for certain plants such as *Antrocaryon klaineanum*. Plants have been listed according to the family alphabetic order, local name, plants part(s) used and the traditional preparation, *in vivo* and/or *in vitro* anti-diabetic activity and other pharmacological activites applied traditionally in Table 1, and toxicity and chemical constituants in table 2.

Results / Discussion

All 69 medicinal plants have been presented in both Table 1 and 2, with known information from the literature outlined and cited. The data has been obtained from ethnobotanical studies originating from different regions in Gabon and frompublished research papers. Among these

plants, 37 families were recorded with *Apocynaceae* being the most cited with 6 plant species, followed by *Annonaceae*, *Malvaceae* and *Poaceae* with 4 plant species each and *Anacardiaceae*, Aster*aceae*, *Euphobiaceae*, *Fabiaceae*, *Leguminosaeae* and *Mimosoideae* with 3 plant species each.

Generally, plant potential anti-diabetic activity was assessed by *in vivo* (animal models and humans) and *in vitro* (islets and hepatocytes) sugar (usually glucose) lowering effect. From a scientific perspective, only experimental validations at known doses and in specific design, may provide a good idea of a plant safety and efficacy. While, in traditional approach, the taste of the urine and the well-being of the patient after treatment prove plant preparations efficacy.

The majority of plants reviewed here (74%) has *in vivo* and/ or *in vitro* studies that evidenced anti-diabetic properties and support their use by traditional healer for the management of diabetes. However, 26% of reviewed plants including *Antrocaryon klainenum*, *Voacanga Africana* and *Aucoumea klaineana,* have no experimental evaluation of their anti-diabetic effects, either *in vitro* or *in vivo*. Although, these plants contained molecules such as flavonoids, alkaloids and saponins (Table 2), that have known anti-diabetic properties which can justify their use in the management of hyperglycaemia in traditional medicine.

Several reviews on medicinal plants and/or anti-diabetic plants from different parts of the world exist and highlight medicinal herbs value for the management of number of diseases including diabetes (Patel et al. 2012; Ezuruike and Prieto, 2014; Lakshmi et al., 2016; Tjeck et al., 2017). Ethnobotanical surveys result's and data collected from literature on plants used for the management of diabetes in Gabon showed that plants are used either alone or in combination, such as with *Alstonia congensis* and *Xylopia aethiopica, Rauvolfia vomitoria* and *Citrus aurantium*. In traditional medicine, plants combination is the favourite preparation, although, not

easy to assess in laboratory animal model or in tissue. Only one plant, *Petroselinum crispum,* out of 69 was used in combination with a conventional anti-diabetic drug, glibornuride, a sulfonylurea.

Out of 69 plants, 47 plants had literature outlining *in vivo* experimental data in established Type 1 diabetic animal (alloxan or streptozotocin(STZ)-induced diabetes) models, Table 1. type 1 Depending on the dose used, streptozotocin and alloxan chemically destroy a significant number of beta cells in pancreas to induce type 1 diabetes.

Although most Gabonese plants were assessed experimentally in Type 1 animal models, 8 plants have been assessed in Type 2 animal models. For example, *Milicia excelsia* aqueous extract at 50 and 100 mg/kg administered orally prevented insulin resistance and blood glucose rise in dexamethasone-induced insulin resistance in rats (Dzeufiet et al., 2014) and *Zea mays* corn extract at 50 mg/kg increased C-peptide levels, prevented pancreatic β-cells damage and increased their insulin content in type 2 model C57BL/KsJ db/db mice (Huang et al., 2015). This encouraging data demonstrated that some plants are targeting parameters that contribute to Type 2 Diabetes development and occur in pre-diabetics, such as insulin resistance. Thus, type 2 Diabetes can be managed at a very early stage by these plants. Type 2 diabetes is the most prevalent type of diabetes mellitus worldwide with increasing morbidity (Motala and Ramaiya, 2010). Thus, the Type 1 animal models used in most reviewed studies are not adequate to assess plants efficacy used to treat type 2 diabetic parameters such as insulin resistance or glucose tolerance. Numerous pharmacological experiments reviewed here involved aqueous (39 studies) plant extracts, negative and positive controls with glibenclamide, tolbutamide or metformin as anti-diabetic drug of reference. Organic extracts were not often used even though, they could be more efficient than water extract; e.g.: the leaves ethanol (400 mg/kg bw) and chloroform (800

mgto 1 g/kg bw) extract of *Vernonia amygdalina* Del. which exerted effective improvement in glucose tolerance and decreased Fasting Blood Glucose (FBG) in STZ-induced diabetic rats. The traditional most cited formulations were decoction (40 plants), maceration (22 plants) and infusion (11 plants), which can support the use of water extract over organic's, to investigate the effects claimed by traditional healers. Negative control was including in most of studies reviewed, however, the positive control was missing for some investigations; for example, in the study of the root aqueous extract at 500 and 1000 mg/kg bw of *Newbouldia laevis* (P. Beauv.) Seem by Okonkwo and Okoye in 2009. Thus, the experiment was incomplete.

Only 5 plants reviewed had data in diabetic patients; *Allium cepa*, *Rauvolfia vomitoria*, *Jatropha curcas*, *Irvingia gabonensis* and *Ipomea batatas*. This was surprising given that a large number of Gabonese plants had known safe doses and showed significant *in vivo* and/or *in vitro* anti-diabetic efficacy data in animal models justifying a clear rationale for the management of diabetes and a controlled clinical trial evaluation, such as *Allium sativum*, *Alstonia boonei* and *Euphorbia hirta*. It can be explained as numerous pharmacological studies reviewed have problematic methods including high doses and poor experimental design. Even though, high doses reported were usually for spices such as *Persea americana*, they need to be adapted from animal models to patients in clinical trials; e.g. *Zea mays*, *Ipomea batatas* and *Allium sativum* (Table 1).

Fourteen plants out of 69 have *in vitro* experimental data that could support part or all of their anti-diabetic mechanism of action. It is well recommended that *in vitro* experiments are carried out to determine the mechanism of anti-diabetic action of the plant. Moreover, due to ethical considerations associated with animal testing, it is greatly advised, where possible, to use non-animal model to validate experiments. The most potential reviewed plants are *Mangifera indica*

kernel flour which inhibited α-amylase, α-glucosidase and aldose reductase, enzymes that contribute to prevent / reduce carbohydrates digestion, thus less absorption of sugar by intestine and less blood glucose levels (Irondi et al., 2014). *Tabernanthe iboga*, which induced insulin secretion from β-cells in high glucose concentration (Souza et al., 2011), Akuammicine from *Picralima nitida* which increased glucose uptake in adipocytes (Kazeem et al., 2013), quercetin from *Psidium guajava* which increased glucose uptake in hepatocytes (Fang-Chui et al., 2009), and *Allium sativum* that enhanced glucose transporter GLUT-4 gene expression (Montasser and Fehresty, 2011).

In vitro experiments are often designed to reproduce existing drugs mechanism of action used for the management of diabetes, such as sulfonylureas. Such mechanistic studies support an easier identification of potential medicinal plants with therapeutic value and have identified natural compounds. However, this experimental approach is only based on known targets and exclude extracts that might act on unknown targets through new mechanisms. Also, for remedies composed of plants mixture, it would not be appropriate to assess plants efficacy by *in vitro* experiments alone, as multiple active metabolites, and multiple targets may be involved.

In the Table 2, the majority of reviewed plants have revealed several bioactive compounds that elicit anti-diabetic effects such as alkaloids, terpenes, phenolic compounds. However, few of them have their isolated active natural product constituents tested for anti-diabetic effects. Indeed, only 12 medicinal herbs have had their anti-diabetic active constituents identified including the xanthone glycosides mangiferin from *Mangifera indica*, akuammicine alkaloids and its analogues from *Picralima nitida* and *Alstonia boonei* which stimulates glucose uptake, indole alkaloids ibogaine and its analogues from *Tabernanthe iboga* which increased beta cells insulin

release and flavonoids neohesperidin and naringin from *Citrus aurantiun* which regulate glucose metabolism enzymes. Furthermore, flavonoids are known to exert antioxidant effects, which is beneficial against many diabetes complications such as artherosclerosis, nephropathy, neuropathy, retinopathy associated with high oxidative stress state (Ezuruike and Prieto, 2014). Certain natural product constituents cited in Table 2 may help to evidenced specific beneficial effects in diabetes by assessing compounds that have previously been studied such as the alkaloids and flavonoids from *Antrocaryon klaineanum*. Moreover, knowing plants active principles could support a better dosage and quality control of plants remedies. Thus, these 12 plants with isolated compounds offer great potential anti-diabetic plants for further investigations. Also, it is important to note that a large number of plants reviewed here are currently being taken by diabetic patients alone or in combination with conventional anti-diabetic drugs in Gabon. Toxicological issues might therefore be associated with plants consumption at wrong dosage or due to compounds interactions. It is well understood that medicinal plants are an abundant source of bioactive compounds that can elicit various biological, pharmacological and toxicological effects within the body. The risk of medicinal plants toxicity is one of the main reason why physicians hesitate to consider medicinal plants as alternative therapeutics in Gabon. Various plants reviewed here have specific organ toxicity such as nephrotoxicity, hepatotoxicity or cardiotoxicity effects (Table 2). However, most of these effects are only seen at high doses which encourage the use of medicinal plants at appropriate safe doses. Among the plants reviewed, the oral lethal dose that kills 50% of the population (LD_{50}) is greater than 2000 mg/kg while the intraperitoneal (IP) LD_{50} is as low as 1 mg/ml (Table 2). Acute and subacute toxicities with dose-related information need to be detailed before the use of medicinal plants. Thirteen plants reviewed have no toxicological information. It is important to highlight that all plants

listed in this review are continuously consumed by the Gabonese population. Thus, it is vital to assess plants toxicity and acknowledged dose efficacy and activities before their use, to avoid unwanted compounds interactions and harm.

Conclusion

This review is the first to present all known literature on the Gabonese medicinal plants and highlights the use of specific plants in the treatment of diabetes. While it is of interest to identify new plants for research, this review also outlines the lack of scientific evidence on Gabonese medicinal plants claimed to be anti-diabetic and currently used by the Gabonese population. Numerous plants are reported in Gabon to be anti-diabetic and are used by traditional healers to treat the population. While 69 plants have been described in the literature, there is very little preliminary data, although there is a great deal of potential for novel diabetic therapy. The lack of reproducible investigations with poor general design and unrealistic doses showed the huge work to be done before getting to phytomedicines from the plants cited. Nevertheless, the results gathered in this review represent a valuable start point to further investigate the medicinal plants already used for the management of diabetes in Gabon. Many points have to be resolved such as the reproducibility of traditional preparation, the appropriate animal model, the experimental design and so on. Although, most of the plants listed in this review reduced blood glucose levels in animal or human model, this parameter alone is not sufficient to prioritise the most potential anti-diabetic plants. The mechanism of action of these plants should be investigated to allow standardised phytomedicines to be available. Toxicological data was also scarce, and the pharmacological and natural compound information of Gabonese anti-diabetic plants is not sufficient. Ibogaine and its congener alkaloids from *Tabernanthe iboga* need particular attention as their anti-diabetic potential can easily be studied. Further investigations are needed to validate

the mechanism of action, clinical efficacy and toxicology of all these plants and to ensure the safety of the Gabonese population.

Above all, this work was done to make available local information to enable future investigations with Gabonese potential anti-diabetic plants and promotote Gabonese traditional knowledge.

References:

Abdelgadir, H.A. and Staden, J.V. 2013. Ethnobotany. ethnopharmacology and toxicity of *Jatropha curcas* L. (Euphorbiaceae): A review. *South African Journal of Botany; 88: 204-218*.

Abdulrazak, N., Asiya, U.I., Usman, N.S. and Unata, I.M., Farida A. 2015. Antiplasmodial activity of ethanolic extract of root and stem back of *Cassia sieberiana* DC on mice. *J. Intercult. Ethnopharmacol., 4(2): 96-101.*

Abdulrazaq, N.B., Cho, M.M., Win, N.N., Zaman, R. and Rahman, M.T. 2011. Beneficial effects of ginger (*Zingiber officinale*) on carbohydrate metabolism in streptozotocin-induced diabetic rats. *British Journal of Nutrition*; *108: 1194-1201*.

Abo-Youssef, A.M.H. and Messiha, B.A.S. 2013. Beneficial effects of *Aloe vera* in treatment of diabetes: Comparative in vivo and in vitro studies. *Bulletin of Faculty of Pharmacy, Cairo University; 51: 7-11.*

Aboge Mebale, A.J., Massimba Dibama, H., Ntsame Affane, A.L., Moumbangou Nzigou, S., Ndoume Ollame, J., Ondo, J.A., and Eba, F. 2013. Phytochemical analyses of aqueous extracts of two medicinal plants from Gabon: *Pseudospondias longifolia* and *Antrocaryon klaineanum. Journal of Natural Sciences Research; (3): 9.*

Abu, A.H., Amuta, P.O., Buba, E. and Inusa, T.R. 2013. Evaluation of antispermatogenic effect of *Garcinia kola* seed extract in Albino rats. *Asian Pacific Journal of Reproduction; 2(1): pp. 15–18.*

Abubakar, M. G., Lawal, A., Suleiman, B., and Abdullahi, K. 2010. Hepatorenal toxicity studies of sub-chronic administration of calyx aqueous extracts of *Hibiscus sabdariffa* in albino rats. *Bayero Journal of Pure and Applied Sciences, 3(1): 16 – 19.*

Adaramoye, O.A. 2012. Antidiabetic effect of kolaviron, a biflavonoid complex isolated from *Garcinia kola* seeds, in Wistar rats. *Afr. Health Sci.; 12(4): 498–506.*

Adebayo, A.H., Tan, N.H., Akindahunsi, A.A., Zeng, G.Z. and Zhang, Y.M. 2010. Anticancer and antiradical scavenging activity of *Ageratum conyzoides* L. (Asteraceae). *Pharmacogn Mag.; 6(21): 62–66.*

Adebolu, T.T. and Oladimeji, S.A. 2005. Antimicrobial activity of leaf extracts of *Ocimum gratissimum* on selected diarrhoea causing bacteria in southwestern Nigeria. *African Journal of Biotechnology; 4 (7): 682-684.*

Adedapo, A.A.., Abatan, M.O., Akinloye, A.K., Idowu, S.O. and Olorunsogo, O.O. 2003. Morphaometric and histopathological studies on the effects of some chromatographic fractions of *Phyllanthus amarus* and *Euphorbia hirta* on the male reproductive organs of rats. *J. Vet. Sci.; 4(2):181–185.*

Adediwura, F.-J., Bernard, N., Omotola, A., 2011. Biochemical effects of chronic administration of Cola acuminata (P. Beauv.) Schott & Endl extracts in alloxan induced diabetic rats. Asian Journal of Pharmaceutical and Biological Research 1, 355–359.

Adedoyin, T.A., Imoru, O.J., Ofem, E. and Akpan J. 2015. Effects of *Cassia alata* root extract on smooth muscle activity. *BJPR; 5(6): 406-418.*

Adelusi, T.A, Oboh, G., Ayodele, J.A, Richard, A.A. and Bakare, O.O. 2014. Avocado pear fruits and leaves aqueous extracts inhibit alpha-amylase, alpha-glucosidase and SNP induced lipid peroxidation- An insight into mechanisms involve in the management of type 2 diabetes. *International Journal of Applied and Natural Sciences; 3(5); 21-34.*

Ademuyiwa, A.J., Olamide, O.Y. and Oluwatosin, O.O. 2015. The effects of *Cymbopogon citratus* (Lemon grass) on the blood sugar level, lipid profiles and hormonal profiles of Wistar rats. *Merit Research Journals of Medicine and Medical Sciences; 3(6): 210-216.*

Adeneye, A.A. 2009. Protective activity of the stem bark aqueous extract of *Musanga cecropioides* in carbon tetrachloride and acetaminophen induced acute hepatotoxicity in rats. *Afr. J. Tradit. Complement. Altern. Med.; 6(2): 131–138.*

Adeneye, A.A. 2012. The leaf and seed aqueous extract of *Phyllantus amarus* improves insulin resistance diabetes in experimental animal studies. *Journal of Ethnopharmacology; 144: 705-711*.

Adeneye, A.A. and Agbaje, E.O. 2007. Hypoglycemic and hypolipidemic effects of fresh leaf aqueous extract of *Cymbopogon citratus* Stapf. in rats. *Journal of Ethnopharmacology; 112: 440-444.*

Adeneye, A.A., Ajagbonna, O.P. and Ayodele, O.W. 2007. Hypoglycemic and antidiabetic activities on the stem bark aqueous and ethanol extracts of *Musanga cecropioides* in normal and alloxan-induced diabetic rats. *Fitoterapia; 78: 502-505*

Adeneye, A.A., Ajagbonna, O.P., Adeleke T.I. and Bello S.O. 2006. Preliminary toxicity and phytochemical studies of the stem bark aqueous extract of *Musanga cecropioides* in rats. J. Ethnopharmacol.; 105 (3): 374-9.

Adenubi, O.T., Raji, Y., Awe, E.O. and Makinde, J.M. 2010. The effect of the aqueous extract of

the leaves of *Boerhavia diffusa* Linn. on semen and testicular morphology of male wistar rats. *Science World Journal; 5 (2).*

Aderibigbe, A.O., Iwalewa, E.O., Adesina, S.K. and Agboola, O.I. 2010. Studies of behavioural and neural mechanism of aridanin isolated from *Tetrapleura tetraptera* in Mice. *International Journal of Pharmacology; 6: 480-486.*

Adeyemi, D.O., Ukwenya, V.O., Obuotor, E.M. and Adewolw, S.O. 2014. Anti-hepatotoxic activities of *Hibiscus sabdariffa* L. in animal model of streptozotocin diabetes-induced liver damage. *BMC Complementary & Alternative Medicine;14: 277.*

Adisa, R.M., Choudhary, M.I., and Olorunsogo, O.O. 2011. Hypoglycemic activity of *Buchholzia coriacea* (Capparaceae) seeds in streptozotocin-induced diabetic rats and mice. *Experimental and Toxicologic Pathology; 63: 619-625.*

Adjene, J.O. and Nwose, E.U. 2010. Histological effects of chronic administration of *Phyllanthus amarus* on the kidney of adult Wistar rat. *N. Am. J. Med. Sci.; 2(4):193-5.*

Adler, B.B. and Beuchat, L.R. 2002. Death of *Salmonella*, *Escherichia coli* 0157:H7, and *Listeria monocytogenes* in garlic butter as affected by storage temperature. *J. Food Prot.; 65:1976–1980.*

Agbor, G.A., Tarkang, P.A., Fogha, J.V.Z., Biyiti, L.F., Tamze, V., Messi, H.M., Tsabang, N., Longo, F., Tchinda, A.T., Dongmo, B., Donfagsiteli, N.T., Mbing, J.N., Joseph, K., Ngide, R.A. and Simo, D. 2012. Acute and Subacute Toxicity Studies of Aqueous Extract of *Morinda lucida* Stem Bark. *Journal of Pharmacology and Toxicology, 7: 158-165.*

Agnaniet, H., Mbot, E.J., Keita, O., Fehrentz, J.A., Ankil, A., Gallud, A., Garcia, M., Gary-Bobo, M., Lebibi, J., Cresteil, T., and Menut, C. 2016. Antidiabetic potential of two medicinal plants used in Gabonese folk medicine. *BMC Complementary and Alternative Medicine; 16: 17.*

Agunbiabe, O.S., Ojezele, O.M., ojezele, J.O. and Ajayi, A.Y. 2012. Hypoglycaemic activity of

Commelina africana and *Ageratum conyzoides* in relation to their mineral composition. *African Health Sciences; 12(2): 198-203.*

Aguora, S.O., Unekwe, P.C., and Okechukwu, E.C. 2015. Evaluation of antidiabetic activity of *Nauclea latifolia* chloroform root extract in normal and alloxan-induced diabetic rats. *Journal of Pharmacy and Biological Sciences; 10 (3): pp. 53-57.*

Agyare, C., Owusu-Ansah, A., Ossei, P.P.S., Apenteng, J.A. and Boakye, Y.D. 2014. Wound healing and anti-infective properties of *Myrianthus arboreus* and *Alchornea cordifolia. Med. Chem.; 4:533-539.*

Aibinu, I., Adenipekun, T., Adelowotan, T., Ogunsanya, T. and Odugbemi, T. 2007. Evaluation of the antimicrobial properties of different parts of Citrus aurantifolia (lime fruit) as used locally. *Afr. J. Tradit. Complement Altern. Med.; 4(2): 185–190.*

Ajaiyeoba, E.O., Onocha, P.A., Nwozo, S.O. and Sama, W. 2003. Antimicrobial and cytotoxicity evaluation of Buchholzia coriacea stem bark. *Fitoterapia; 74(7-8): 706-9.*

Ajaiyoeba, E.O., Abalogu, U.I., Krebs, H.C. and Oduola, A.M. 1999. *In-vivo* antimalarial activities of *Quassia amara* and *Quassia undulate* plant extracts in mice. *J Ethnopharmacol.; (67)3: 321-325.*

Ajayi, G.O. and Igboekwe, N.A. 2013. Evaluation of anti-diabetic potential of the leaves of *Musanga cecropioides* R. Brown. *Planta Med.; 79.*

Ajiboye, A.A., Fadimu, O.Y., Ajoboye, M.D., Agboola, D.A., Adelaja, A.B. and Bem, A.A. 2014. Phytochemical and nutritional constituents of some common vegetables in South-West, Nigeria. *Global Journal of Science Frontier Research (C); 14(3): 1.*

Ajiboye, B.O., Edobor, G., Ojo, A.O., Onikanni, S.A., Olaranwaju, O.I. and Muhammad, N.O. 2014. Effect of aqueous leaf extract of *Senecio biafrae* on hyperglycaemic and serum lipid

profile of alloxan-induced diabetic rats. *International Journal of Disease and Disorders; 2(1): pp 059-064.*

Akah, P., Njoku, O., Nwanguma, A. and Akunyili, D. 2004. Effects of aqueous leaf extract of *Vernonia amygdalina* on blood glucose and triglyceride levels of alloxan–induced diabetic rats (rattus rattus). *Animal Research International; 1(2): 90 – 94.*

Akash, M.S.H., Rehman, K. and Chen, S. 2014. Spice plant *Allium cepa*: Dietary supplement for treatment of type 2 diabetes mellitus. *Nutrition; 30: 1128-1137.*

Akinloye, O.A, Balogun, E.A., Omotainse, S.O. and Adeleye, O.O. 2014. Some effects associated with the use of the biopreparation from *Picralima nitida* seeds extract as anti-diabetic agent. *Biotechnologia ACTA; 7(2).*

Akinsulire, O.R., Aibinu, I.E., Adenipekun, T., Adelowotan, T. and Odugbemi, T. 2007. *Invitro* antimicrobial activity of crude extracts from plants *Bryophyllum pinnatum* and *Kalanchoe crenata*. *Afr. J. Trad. CAM); 4 (3): 338 – 344.*

Akpanyung E.O., Ita, S. O., Opara, K. A., Davies, K. G., Ndem, J. I. and Uwah, A. F. 2013. Phytochemical screening and effect of ethanol root extract of *Microdesmis puberula* on some haematological and biochemical parameters in normal male albino Wistar rats. *J. Med. Plants Res.; 7(31): 2338- 2342.*

Al-Amin, Z.M., Thomson, M., Al-Qattan, K.K., Peltonen-Shalaby, R., and Ali, M. 2006. Anti-diabetic and hypolipidaemic properties of ginger (*Zingiber officinale*) in streptozotocin-induced diabetic rats. *British Journal of Nutrition*; *96: 660-666.*

Al-Shaqha, W.M., khan, M., Salam, N., Azzi, A. and Chaudhary, A.A. 2015. Anti-diabetic potential of *Catharanthus roseus* Linn. and its effect on the glucose transport gene (GLUT-2 and GLUT-4) in streptozotocin induced diabetic Wistar rats. *BMC Complementary & Alternative*

Medicine; 15: 379.

Aladesanmi, A.J. 2007. *Tetrapleura tetraptera*: Molluscicidal activity and chemical constituents. *Afr. J. Trad. CAM; 4(1): 23-36.*

Aladodo, R.A., Muhammad, N.O. and Balogun, E.A. 2013. Effects of aqueous root extract of *Jatropha curcas* on hyperglycaemic and haematological indices in alloxan-induced diabetic rats. *Fountain Journal of Natural and Applied Sciences; 2: 52-58.*

Alaribe, C.S., Coker, H.A.B., Shode, F., Ayoola, G., Adesegun, S., Singh, N., Anyim, E. and Iwuanyanwu, S. 2012. Antimicrobial effects of extracts and decussatin from *Anthocleista vogelii* (Planch). *Pharmacologyonline Archives; (2): 98-103.*

Alnaqeeb, M.A., Thomson, M., Bordia, T. and Ali, M. 1996. Histopathological effects of garlic on liver and lung of rats. *Toxicol Lett.; 85(3):157-64.*

Amaechina, F.C. and Omogbai, E.K. 2007. Hypotensive effect of aqueous extract of the leaves of Phyllanthus amarus Schum and Thonn (Euphorbiaceae). *Acta Pol Pharm.; 64(6):547-52.*

Amalu, P.C., Chukwuezi, F.O. and Ugwu, O.P.C. 2014. Antimicrobial effects of bitter kola (*Garcinia kola*) nut on *Staphylococcus aureus*, *Eschererichia coli* and *Candida alibicans*. *Journal of Dental and Medical Sciences; 13(4):29-32*.

Amole, O.O., Onabanjo, A.O., and Odofin, A.A. 2006. The analgesic effect of *Rauvolfia vomitoria* (Afzel). *Biomedical Research; 17 (2):125–127.*

Amole, O.O., Yemitan, O.K. and Oshikoya, K.A. 2009. Anticonvulsant activity of *Rauvolfia Vomitoria* (Afzel). *African Journal of Pharmacy and Pharmacology; 3(6):319-322.*

Anaduaka, E.G., Ogugua, V.N., Agu, C. V. and Okonkwo, C.C. 2014. Ethanol extracts of *Newbouldia laevis* stem and leaves modulate serum liver marker enzymes and antioxidant enzymes activities in diabetic rats. *African Journal of Biotechnology; 13(22): 2265-2272.*

Anderson, R., Broadhurst, C.L., Polansky, M.M., Schmidt, W.F., Khan, A., Flanagan, V.P., Schoene, N.W. and Graves, D.J. 2004. Isolation and characterization of polyphenol type-A polymers from Cinnamom with insulin - like biological activity. *Journal of Agricultural and Food Chemistry; 52: 65-70.*

Andrade, C.U., Perazzo, F.F. and Maistro, E.L. 2008. Mutagenicity of the *Musa paradisiaca* (Musaceae) fruit peel extract in mouse peripheral blood cells in vivo. *Genet Mol Res.; 7(3): 725-32.*

Anosike, C.A., Ugwu, J.C., Ojeli, P.C. and Abugu, S.C. 2014. Anti-ulcerogenic effects and anti-oxidative properties of *Ceiba pentandra* leaves on alloxan-induced diabetic rats. *European Journal of Medicinal Plants; 4(4): 458-472.*

Anowi, C.F., Cardinal, N.C., Ezugwu, C.O. and Utoh-Nedosa U.A.2012. Antimicrobial properties of the chloroform extract of the stem bark of *Nauclea latifolia*. *Int J Pharm Pharm Sci.; 4 (2): 744-750.*

Anowi, C.F., Ike, C., Ezeokafor, E. and Ebere, C. 2012. The phytochemical, antispasmodic and antidiarrhoea properties of the methanol extract of the leaves of *Buchholzia coriacea* family Capparaceae. *Int J. Curr. Pharm. Res.; 4 (3): 52-55.*

Ansah, C., Oppong, E. and Woode, E. 2011. Subacute oral toxicity assessment of *Alchornea cordifolia* (Schumach and Thonn) Müll Arg (Euphorbiaceae) extract in rats. *Tropical Journal of Pharmaceutical Research; 10 (5): 587-594.*

Antia, B.S., and Okokon, J.E. 2014. Phytochemical composition and antidiabetic activity of ethanol root extract of *Nauclea latifolia*. *The Journal of Phytopharmacology; 3(1): 52-56.*

Antia, B.S., Okokon, J.E., Nwidu, L.L. and Jackson, C.L. 2006. Effect of sub-chronic administration of ethanolic stem bark extract of *Mammea Africana* Sabine on haematological and

biochemical parameters of rats. *African Journal of Biomedical Research; 9(2): 129-132.*

Antwi, D.A., Asiedu-Gyekye, I.J., Awortwe, C., Adjei, S. and Addo, P. 2013. A single oral high dose toxicity study of *Kalanchoe integra* var. *crenata* (Andr.) cuf leaf extract in ICR mice: histopathological and biochemical changes. *IJMPS. ; 3(9): 08-17.*

Anyanwu, G.O., Rehman, N.U., Onyeneke, C.E. and Rauf, K. 2015. Medicinal plants of the genus *Anthocleista* - A review of their ethnobotany, phytochemistry and pharmacology. *Journal of Ethnopharmacology; 175: 648-667.*

Apers, S., Cimanga, K., Van den Bergehe, D., Van Meenen, W., Longanga, A.O., Foriers, A., Vlietinck, A. and Pieters, L. 2002. Antiviral activity of simalikalactone D, a quassinoids from *Quassia africana*. *Planta Med; 68(1): 20-24.*

Areola, J. O., Babalola, O. O., Ilesanmi, O. R. and Oyedapo, O. O. 2015. Toxicity Studies of the Ethanolic Stem- Bark Extract of *Milicia excelsa* (Welw.) C. C. Berg in Wistar Rats. *American Journal of Biochemistry; 5(6): 131-137.*

Arhoghro, E.M., Ekpo, K.E. and Ibeh, G.O. 2009. Effect of aqueous extract of scent leaf (*Ocimum gratissimum)* on carbon tetrachloride (CCl4) induced liver damage in albino Wister rats. *African Journal of Pharmacy and Pharmacology; 3:11 (562-567).*

Arthur F.K., E. Woode, E. Terlabi, C. Larbie. Evaluation of acute and subchronic toxicity of *Annona muricata* (Linn.) aqueous extract in animals. *Eur. J. Exp. Biol., 1 (2011), pp. 115-124.*

Asadu, C.L., Abonyi, O., Anosike, C.A., Uzoegwu, P.N. and Uroko, R.I. 2015. In vivo Toxicological Studies on Methanol Leaf Extract of Lantana camara. *American-Eurasian Journal of Toxicological Sciences 7 (2): 115-122.*

Asare, G.A., Bugyei, K., Fiawoyi, I., Asiedu-Gyekye, I.J., Gyan, B., Adjei, S., Addo, P., Otu-

Nyarko, L. and Nyarko, A. 2013. Male rat hormone imbalance, testicular changes and toxicity associated with aqueous leaf extract of an antimalarial plant*: Phyllanthus niruri. Pharm Biol.; 51(6): 691-9.*

Asase, A., Kokubun, T., Grayer, R.J., Kite, G., Simmonds, M.S.J., Oteng-Yeboah, A.A. and Odamtten, G.T. 2008. Chemical constituents and antimicrobial activity of medicinal plants from Ghana: *Cassia sieberiana, Haematostaphis barteri, Mitragyna inermis* and *Pseudocedrela kotschyi. Phytotherapy Research; 22: 1013-1016.*

Asha, B., Krishnamurthy, K.H. and Devaru, S. 2011. Evaluation of anti-hyperglycaemic activity of *Zingiber officinale* (Ginger) in albino rats. *Journal of Chemical and Pharmaceutical Research; 3(1): 452- 456.*

Ashraf, R., Aamir, K., Shaikh, A.R. and Ahmed, T. 2005. Effects of garlic on dyslipidaemia in patients with type 2 diabetes mellitus. *J. Ayub Med. Coll. Abbottabad.; 17: 60–64.*

Asuquo, E. G. and Udobi, C. E. 2016. Antibacterial and toxicity studies of the ethanol extract of *Musa paradisiaca* leaf. *Cogent Biology; 2: 10.*

Assob, J.C., Kamga, H.L., Nsagha, D.S., Njunda, A.L., Nde, P.F., Asongalem, E.A., Njouendou, A.J. Sandjon, B. and Penlap, V.B. 2011. Antimicrobial and toxicological activities of five medicinal plant species from Cameroon Traditional Medicine. *BMC Complementary and Alternative Medicine*; 11-70.

Atangwho, I.J., Egbung, G.E., Ahmad, M., Yam, M.F. and Asmawi, M.Z. 2013. Antioxidant versus anti-diabetic properties of leaves from *Vernonia amygdalina* Del. growing in Malaysia. *Food Chemistry; 141: 3428-3434.*

Atawodi, S.E., Adepoju, O.A. and Nzelibe, H.C. 2017. Antihyperglycaemic and hypolipidemic effect of methanol extracts of *Ageratum conyzoides* L (Asteraceae) in normal and diabetic rats.

Tropical Journal of Pharmaceutical Research; 16 (5): 989-996.

Atawodi, S.E.O., Yakubu, O.E., Liman, M.L. and Iliemene, D.U. 2014. Effect of methanolic extract of *Tetrapleura tetraptera* (Schum and Thonn) Taub leaves on hyperglycaemia and indices of diabetic complications in alloxan-induced diabetic rats. *Asian Pacific Journal of Tropical Biomedicine; 4(4): 272-278.*

Awah F.M., Uzoegwu P.N., Ifeonu P., Oyugi J.O., Rutherford J., Yao X., Fehrmann F., Fowke K.R., Eze M.O. 2012. Free radical scavenging activity, phenolic contents and cytotoxicity of selected Nigerian medicinal plants. *FoodChemistry131, 1279–1286.*

Awe S.O. & Poeke O.O**.** 1990. Effect of *Alstonia congensis* on *Plasmodium berghei berghei* in mice. *Fitoterapia 61(3): 225–229.*

Awe S.O., Makinde J.M., Olajide O.A. 1999. Cathartic effect of the leaf extract of *Vernonia amygdalina*. *Fitoterapia, 70: 161–165.*

Awodele, O., Oreagba, I.A., Odoma, S., Teixeira da Silva, J.A. and Osunkalu, V.O. 2012. Toxicological evaluation of the aqueous leaf extract of *Moringa oleifera* Lam. (Moringaceae). *Journal of Ethnophamacology; 139: 330-336.*

Ayepola, O.R, Chegou, N.N., Brooks, N.L. and Oguntibeju, O.O. 2013. Kolaviron, a *Garcinia* biflavonoid complex hyperglycemi-mediated hepatic injury in rats via suppression of inflammatory responses. *BMC Complementory and Alternative Medicine; 13: 363.*

Aziba P.I. 2005. Inhibitory effects of *Musanga cecropioides* on noradrenaline and potassium-induced contractions in rat thoracic aorta**.** *African Journal of Biomedical Research, Vol. 8, 59 – 61.*

Baba G., Adewumi A.A.J. and Jere S.A. 2014. Toxicity study, phytochemical characterization and anti-parasitic efficacy of aqueous and ethanolic extracts of *Sclerocarya birrea* against

Plasmodium berghei and Salmonella typhi**.** *British Journal of Pharmacology and Toxicology 5(2): 59-67.*

Balasubramanian K., and Padma P.R. 2012 screening of antioxidant properties of *Zea mays* leaves at different time periods of growth. *Journal of Pharmacy Research, 5(8), 4034-4037.*

Bamisaye, F.A., Odutuga, A.A., Minari, J.B., Dairo, J.O., Oluba, O.M. and Babatola, L.J. 2013. Evaluation of hypoglycemic and toxicological effects of leaf extracts of *Morinda lucida* in hyperglycaemic albino rats. *International Research Journal of Biochemistry and Bioinformatics; 3(2): 37-43.*

Bapna, S., Ramaiya, M. and Chowdhary, A. 2014. Brine shrimp toxicity and *in vitro* antimalarial activity of *Citrus aurantifolia* (Christm.) Swingle against *Plasmodium falciparum* 3D7. *Journal of Pharmacy and Biological Sciences; 9 (5): 24-27.*

Bardi, A.D., Halabi, M.F., Abdullah, N.A., Rouhollahi, E., Hajrezaie, M. and Abdulla, M.A. 2013. *In Vivo* Evaluation of Ethanolic Extract of *Zingiber officinale* Rhizomes for Its Protective Effect against Liver Cirrhosis. *BioMed Research International*.

Bayan, L., Koulivand, P.H. and Gorji, A. 2014. Garlic: a review of potential therapeutic effects. *Avicenna J. Phytomed.; 4(1): 1–14.*

Belemkar, S., Dhameliya, K. and Pata, M.K. 2013. Comparative study of garlic species (*Allium sativum* and *Allium porrum*) on glucose uptake in diabetic rats. *Journal of Taibah University Medical Sciences; 8(2): 80-85.*

Bella, N.M.T., Ngo, L.T. E., Aboubakar, O.B.F., Tsala, D.E. and Dimo T. 2012. Aqueous extract of *Tetrapleura tetraptera* (Mimosaceae) prevents hypertension, dyslipidaemia and oxidative stress in high salt-sucrose induced hypertensive rats. *Pharmacologia; 3 (9): 397-405.*

Ben-Chioma, A.E., Tamuno-Emine, D.G. and Dan, D.B. 2015. The effect of *Abelmoschus*

esculentus in alloxan-induced diabetic Wistar rat. *International Journal of Science and Research; 4(11): 540-543.*

Bera, S., Bhattacharya, S., Pandey, J.N. and Biswas, M. 2013. Acute and sub-chronic toxicity study of *Musa paradisiaca* leaf extracts in mice. *Journal of Advanced Pharmacy Education & Research; 3(2).*

Biney, R.P., Benneh, C.K., Ameyaw, E.O., Boakye-Gyasi, E. and Woode, E. 2016. *Xylopia aethiopica* fruit extract exhibits antidepressant-like effect via interaction with serotonergic neurotransmission in mice. *Journal of Ethnopharmacology, 184: 49-57.*

Bisong, S., Brown, R., and Osim, E. 2011. Comparative effects of *Rauwolfia vomitoria* and chlorpromazine on social behaviour and pain. *N. Am. J. Med. Sci.; 3(1): 48–54.*

Blum, A., Loerz, C., Martin, H.J, Staab-Weijnitz, C.A. and Maser, E. 2012. *Momordica charantia* extract, an herbal remedy for type 2 diabetes, contains a specific 11beta-hydroxysteroid dehydrogenase type 1 inhibitor. *Journal of Steroid Biochemistry & Molecular Biology; 128: 51-55.*

Brantley A.U., Akaninwor, J. O. and Amadi, B. A. 2015. Acute Toxicity and Histological Findings of Aqueous Stem Extract of *Pennisetum purpureum* on Alloxan–Induced Diabetic Wistar-Albino Rats. *Open Science Journal of Pharmacy and Pharmacology; 3(6): 66-71.*

Bunyapraphatsara, N., Yongchaiyudha, S., Rungpitarangsi, V. and Chokechaijaroenporn, O. 1996. Antidiabetic activity of *Aloe vera* L. juice II. Clinical trial in diabetes mellitus patients in combination with glibenclamide. *Phytomedicine; 3(3):245–248.*

Campbell-Tofte, J.I.A., Mølgaard, P., Josefsen, K., Abdallah, Z., Hansen, S.H., Cornett, C., Mu, H., Richter, E.A., Petersen, H.W., Nørregaard, J.C., Winther, K., 2011. Randomized and double-blinded pilot clinical study of the safety and anti- diabetic efficacy of the Rauvolfia-Citrus tea, as

used in Nigerian traditional medicine. *Journal of Ethnopharmacology; 133: 402–411.*

Campbell, J.I., Mortensen, A., Mølgaard, P. 2006. Tissue lipid lowering-effect of a traditional Nigerian anti-diabetic infusion of *Rauwolfia vomitoria* foliage and *Citrus auratium* fruit. *Journal of Ethnopharmacology; 104: 379-386.*

Capasso A. 2013. Antioxidant action and therapeutic efficacy of *Allium sativum* L. *Molecules.; 18: 690–700.*

Casanova, L.M., da Silva, D., Sola-Penna, M., de Magalhães Camargo, L.M., de Moura Celestrini, D., Tinoco, L.W. and Costa, S.S. 2014. Identification of chicoric acid as a hypoglycemic agent from *Ocimum gratissimum* leaf extract in a biomonitoring in vivo study. *Fitoterapia; 93: 132-141.*

Chawla, A., Chawla, P. and Mangalesh, R.R.C. 2011. *Asparagus racemosus* (Willd): biological activities & its active principles. *Indo-Global Journal of Pharmaceutical Sciences;1 (2): pp. 113-120.*

Chika., A. and Bello, S.O. 2010. Antihyperglycemic activity of aqueous leaf extract of *Combretum micranthum* (Combretaceae) in normal and alloxan-induced diabetic rats. *Journal of Ethnopharmacology; 129 (1): 34-37.*

Chokshi, D. 2007. Subchronic oral toxicity of a standardized white kidney bean (*Phaseolus vulgaris*) extract in rats. Food and Chemical Toxicology; 45: 32–40.

Choudhary, M., Kochhar, A. and Sangha, J. 2014. Hypoglycemic and hypolipidemic effect of *Aloe vera* L. in non-insulin dependent diabetics. *Journal of Food Science and Technology;51(1): 90-96.*

Choudhary, D. and Sharma, D. 2014. Phytopharmacological review on *Asparagus racemosus. International Journal of Science and Research; 3 (7): 2319-7064.*

Chris-Ozoko, L.E., Ekundina, V. and Winiki, C. 2015. Histomorphological effects of *Xylopia aethiopica* on the liver and kidney of albino rats. *Scholars Academic Journal of Biosciences; 3(2A): 150-154.*

Chude, M.A., Orisakwe, O.E., Afonne, O.J., Gamaniel, K.S. Vongtau, O.H. Obi, E. 2001. Hypoglycaemic effect of the aqueous extract of *Boerhavia diffusa* leaves. *Indian Journal of Pharmacology; 33: 215-216.*

Chunlaratthanaphorn, S., Lertprasertsuke, N., Srisawat, U., Thuppia, A., Ngamjariyawat, A., Suwanlikhid, N.and Jaijoy, K. 2007. Acute and subchronic toxicity study of the water extract from root of *Citrus aurantifolia* (Christm. et Panz.) Swingle in rats. *Songklanakarin J. Sci. Technol. Vol.29 (1): 125-139.*

Chunlaratthanaphorn, S., Lertprasertsuke, N., Srisawat, U., Thuppia, A., Ngamjariyawat, A., Suwanlikhid, N. and Jaijoy, K. 2007. Acute and sub chronic toxicity study of the water extract from root of *Citrus aurantifolia* (Christm. et Panz.) Swingle in rats. *Songklanakarin J. Sci. Technol.; 29(1).*

Coolborn, A.F, Bolatito, B. and Clement, A.F. 2012. Study of acute and sub chronic toxicity of *Spathodea campanulata* P Beav leaf. *International Conference on Environmental, Biomedical and Biotechnology; 41.*

Coolborn, A.F., Bolatito, B., Omolara, A.V. and Adetu, F.C. 2015. Phytochemical and Antioxidant Effect of *Spathodea campanulata* leaf Extracts. *International Journal of Biochemistry Research & Review, 7(33):148-159.*

Cooper, R.G. 2007. Accidental poisoning from *Lantana camara* (Cherry pie) Hay fed to ostriches (*Struthio camelus*). *Turk. J. Vet. Anim. Sci.; 31(3): 213-214.*

Coria-Téllez, A.V., Montalvo-Gónzalez, E., Yahia, E.M. and Obledo-Vázquez, E.N. 2016.

Annonia muricata: A comprehensive review on its traditional medicinal uses, phytochemicals, pharmacological activities, mechanisms of action and toxicity. *Arabian Journal of Chemistry*.

Dadzeasah, P. E. A., 2012. Safety evaluation and hepatoprotective activity of the aqueous stem bark extract of *Spathodea campanulata*. *PhD Thesis*.

Dah-Nouvlessounon, D., Baba-Moussa, F., Adjanohoun, A., Sina, H., Noumavo, P.A., Adoukonou-Sagbadja, H., Diarrassouba, N., N'tcha, C., Anago., F.S and Baba-Moussa, L. 2015. Phytochemical screening and biological activities of *Garcinia kola* (bark, leaves and seeds) collected in Benin. *African Journal of Microbiology Research; 9 (28): 1716-1727.*

Dahake, R., Roy, S., Patil, D., Rajopadhye, S., Chowdhary, A. and Deshmukh, R.A. 2013. Potential anti-HIV activity of *Jatropha curcas* Linn. leaf extracts. *J. Antivir. Antiretrovir.; 5: 160-165.*

Desta, B. 1994. Ethiopian traditional herbal drugs. Part III: Anti-fertility activity of 70 medicinal plants. *J. Ethnopharmacol.; 44: 199-209.*

Dhanabalan, R., Doss, A., Jagadeeswari, M., Karthic, R., Palaniswamy, M. and Angayarkanni J. 2008. Preliminary phytochemical screening and antimalarial studies of *Spathodea campanulatum* P. Beauv leaf extracts. *Ethnobotanical Leaflets; 12: 811-19.*

Dimo, T., Rakotonirina, S. V., Tan, P.V., Azay, J., Dongo, E., Kamtchouing, P. and Cros, G. 2007. Effect of *Sclerocarya birrea* (Anacardiaceae) stem bark methylene chloride/methanol extract on the streptozotocin-diabetic rats. *Journal of Ethnopharmacology; 110: 434-438.*

Djeussi, D.E, Noumedem, J.A.K., Seukep, J.A., Fankam, A.G., Voukeng, I.K., Tankeo, S.B., Nkuete, A.H.L and Kuete, V. 2013. Antibacterial activities of selected edible plants extracts against multidrug-resistant Gram-negative bacteria. *BMC Complementary & Alternative Medicine, 13:164.*

Djimeli, M.N., Chegaing Fodouop, S. P., Njateng, G. S. S., Fokunang, C., Tala, D. S., Kengni, F. and Gatsing, D. 2017. Antibacterial activities and toxicological study of the aqueous extract from leaves of *Alchornea cordifolia* (Euphorbiaceae). *BMC Complementary and Alternative Medicine; 17:349.*

Djomeni Dzeufiet, P.D., Tchamadeu, M.-C., Bilanda, D.C., Mengue Ngadena, Y.S., Kameni Poumeni, M., Nana, D., Dimo, T. and Kamtchouing, P. 2014. Preventive effect of *Milicia excelsa* (Moraceae) aqueous extract on dexamethasone induced insulin resistance in rat. *Research Journal of Pharmaceutical, Biological and Chemical; 5(4): 1232.*

Djomeni, D., Tedong, L., Asongalem, E.A., Dimo, T., Sokeng, S.D. and Kamtchouing, P. 2006. Hypoglycaemic effect of methylene chloride/methanol root extract of *Ceiba pentandra* in normal and diabetic rats. *Indian Journal of Pharmacology; 38(3): 194-197.*

Dongmo, P.M.J., Tchoumbougnang, F., Boyom, F.F., Sonwa, E.T., Zollo, P.H.A. and Menut, C. 2013. Antiradical, antioxidant activities and anti-inflammatory potential of the essential oils of the varieties of *Citrus limon* and *Citrus aurantifolia* growing in Cameroon. *Journal of Asian Scientific Research; 3(10): 1046-1057.*

Donkor, K., Okine, L.N.K., Abotsi, W.K.M. and Woode, E. 2013. Anti-inflammatory and anti-nociceptive effects of ethyl acetate fraction of root bark of *Cassia sieberiana* D.C. in murine models. *Pharmacologia; 4 (4).*

Donkor, K., Okine, L.N.K., Abotsi, W.K.M. and Woode, E. 2014. Acute and sub-chronic toxicity studies of aqueous extract of root bark of *Cassia sieberiana* D.C. in rodents. *Journal of Applied Pharmaceutical Science; 4 (04): 084-089.*

Duze, B.N., Sewani-Rusike, C.R. and Nkeh-Chungag, B.N. 2012. Effects of an ethanol extract of *Garcinia kola* on glucose and lipid levels in streptozotocin induced diabetic rats. *African Journal*

of Biotechnology; 11(33): pp. 8309-8315.

Eboji, O. and Sowemimo, A. 2014. Anti-inflammatory activity of *Musanga cecropioides* R. Br ex. Tedlie. *Planta Med.; 80.*

Effiong, G. S., Udoh, I.E., Essien, G.E., Ajibola, D.O. and Archibong, K.O. 2014. Effect of aqueous extract of *Tetrapleura tetraptera* on excision wounds in albino rats. *International Research Journal of Plant Science; 5(4): 57-60.*

Effiong, G.S., Udoh, I. E., Ndem, E. E. and Ajibola, D. O. 2015. Acute Toxicity Study and Ascertaination of Wound Healing Effect of the Acetone Fraction of *Tetrapleura tetraptera* Fruit in Excision Wound Model. *Journal of Advances in Medical and Pharmaceutical Sciences; 3(3): 112-121.*

Effiong, G.S., Udoh, I.E., Udo, N.M., Asuquo, E.N., Wilson, L. A., Ntukidem, I.U. and Nwoke, I.B. 2013. Assessment of hepatoprotective and antioxidant activity of *Nauclea latifolia* leaf extract against acetaminophen induced hepatotoxicity in rats. *International Research Journal of Plant Science; 4(2) :55-63.*

Effo, K.E., Kouakou-Siransy, G., Irie-Nguessan, G., Sawadogo, R.W., Dally, I.L., Kamenan, A.B., Kouakou, L.S. and Kablan-Brou, J. 2013. Acute toxicity and antipyretic activities of a methanolic extract of *Alchornea cordifolia* leaves. *Pharmacology & Pharmacy; 4: 1-6.*

Eidi, A., Eidi, M. and Esmaeili, E. 2006. Antidiabetic effect of garlic (*Allium sativum* L.) in normal and streptozotocin-induced diabetic rats. *Phytomedicine; 13: 624-629.*

Ejike, C.E.C.C., Awazie, S.O., Nwangozi, P.A. and Godwin, C.D. 2013. Synergistic postprandial blood glucose modulatory properties of *Vernonia amygdalina* (Del.), *Gongronema latifolium* (Benth.) and *Occimum gratissimum* (Linn.) aqueous decoctions. *Journal of Ethnopharmacology; 149: 111-116.*

Ekor, M. 2014. The growing use of herbal medicines: issues relating to adverse reactions and challenges in monitoring safety. *Frontiers in Pharmacology; 4: 177.*

Ekunwe, S.I., Thomas, M.S., Luo, X., Wang, H., Chen, Y., Zhang X. and Begonia, G.B. 2010. Potential cancer-fighting *Ocimum gratissimum* (OG) leaf extracts: increased anti-proliferation activity of partially purified fractions and their spectral fingerprints. *Ethnicity & disease; 20:1.*

El-Demerdash, F.M., Yousef, M.I. and El-Naga, A.N.I. 2005. Biochemical study on the hypoglycemic effects of onion and garlic in alloxan-induced diabetic rats. *Food and Chem. Toxicol.; 43: 57-63.*

Elkhishin, I.A. and Awwad, I.A. 2009. A study of the cardiovascular toxic effects of *Zingiber officinale* (ginger) in adult male albino rats and its possible mechanisms of action. *Mansoura J. Forensic Med. Clin. Toxicol.; 13: (2).*

Elufioye, T.O., Alatise, O.I., Fakoy, F.A., Agbedahunsi, J.M. and Houghton, P.J. 2009. Toxicity studies of *Tithonia diversifolia* A. Gray (Asteraceae) in rats. *Journal of Ethnopharmacology; 122: 410–415.*

Elumalai, A., Mathangi, N., Didala, A., Kasarla, R. and Venkatesh, Y. 2012. A Review on *Ceiba pentandra* and its medicinal features. *Asian J. Pharm. Tech.; 2 (3): 83-86.*

Eluwa, M.A., Ekanem, T.B., Udoh, P.B., Ekong, M.B., Akpantah, A.O., Asuquo, O.R., and Nwakanma, A.O. 2013. Teratogenic effects of crude ethanolic root bark and leaf extracts of *Rauwolfia vomitoria* (Apocynaceae) on the femur of albino Wistar rat foetuses. *Journal of Histology.*

Eneh, F.U., Okechukwu, A.A. and Adindu, C.S. 2015. Phytochemical and antimicrobial properties of the aqueous ethanolic extract of Saccharum officinarum (Sugarcane) bark. *Journal of Agricultural Science; 7 (10).*

Epidi, J.O., Izah, S.C., Ohimain, E.I. and Epidi, T.T. 2016. Phytochemical, antibacterial and synergistic potency of tissues of *Vitex grandifolia*. *Biotechnological Research; 2(2): 69-76.*

Erharuyi, O., Falodun, A., and Langer, P. 2014. Medicinal uses, phytochemistry and pharmacology of *Picralima nitida* (Apocynaceae) in tropical diseases: A review. *Asian Pacific Journal of Tropical Medicine; 1-8.*

Erhirhie, E.O., Ben-Azu, B., Moke, G.E., Chinwuba, P. and Omonjiahio, I.A. 2015. Ethno-pharmacological Review of *Buchhoizia coriacea* (Wonderful Kola*). IJAPBC; 4(1).*

Essien, G.E. and Effiong, G.S. 2014. Anti-progestational, anti-ovulatory and anti-implantation potentials of methanolic extract of *Garcinia kola* seed in female rats. *Int. Res. J. Pharmacol.; 4(2): 22-27.*

Eteng, M.U., Ibekwe, H.A., Abolaji, A.O., Okoi, A.I., Onwuka, F.C. and Osuchukwu, N.C. 2009. Effect of *Rauwolfia vomitoria* Afzel (Apocynaceae) extract on serum amino transferase and alkaline phosphatase activities and selected indices of liver and kidney functions. *African Journal of Biotechnology; 8 (18): 4604-4607.*

Eto, B. 2013. Research in clinical phytopharmacology to develop health care in developing countries: State of the art and perspectives. *Phytopharmacology; 4(2): 149-205.*

Etta, H.E, Olisaeke, C.C. and Iboh, C.I. 2014. Effect of *Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) seeds on the liver and gonads of male albino rats. *Journal of Biology, Agriculture and Healthcare; 4(1).*

Etuk, E.U. and Francis, U.U. 2003. Acute toxicity and efficacy of *Psidium guava* leaves water extract on salmonella typhi infected wistar rats. *Pakistan Journal of Biological Sciences; 6 (3): 195-197.*

Eyong, T. C. 2007. Indigenous knowledge systems and sustainable development: Case study on

central africa. *Tribes and tribals*, 1: 121-139.

Ewenighi, C.o., Dimkpa, U., Adejumo, B.I., Onyeanusi, J.C., Onoh, L.U.M., Ezeugwu, U., Onoh, G.O., Uzor, S., Orji, E. and Anojulu, A. 2013. Estimation of lipid profile and glucose level in alloxan-induced diabetic rats treated with *Cymbopogon citratus* (lemongrass). *Journal of Experimental and Integrative Medicine; 3(3): 249-253.*

Eweka, A. and Enogieru, A. 2011. Effects of Oral Administration of *Phyllanthus Amarus* Leaf Extract on the Kidneys of Adult Wistar Rats- A Histological Study. *African Journal of Traditional, Complementary, and Alternative Medicines*; 8(3): 307-311.

Ewere, E G., Uka, E. and Usunobun, U. 2016. Phytochemical composition, in vitro antioxidant activity and acute toxicity of *Irvingia gabonensis* (O'Rorke) baill ethanolic leaf extract. *International Journal of Biological Research; 4 (1): 36-41.*

Ezeasor, C. K., Chukwuma, C., Ekere, S.O. and Abah, P. 2017. Subchronic toxicity studies of aqueous leaf and stem bark extract of *Irvingia gabonensis* in male albino Wistar rats. *Comparative Clinical Pathology; 26 (3): 553–559.*

Ezejindu, D.N. and Chinweife, K.C. 2013. The effects of *Rauwolfia vomitoria* extract on the liver enzymes of mercury induced hepatotoxicity in adult wistar rats. *International Journal of Pharmaceutical Chemistry; 3 (4).*

Ezejiofor, A.N., Okorie, A. and Orisakwe, O.E. 2013.Hypoglycaemic and tissue-protective effects of the aqueous extract of *Persea americana* seeds on alloxan-induced albino rats. *Malays J Med Sci.; 20(5): 31-39.*

Ezeokeke, E.E., Ene, A.C. and Igwe, C.U. 2017. Sub-Acute Toxicity Studies of *Alchornea cordifolia* Leaf Extract in Swiss Albino Rats. *J Anal Bioanal Tech; 8: 353-6.*

Ezike, A.C., Onyeto, C.A., Nwabunike, I.A., Mbaoji, F.N., Attah, B.E., Amanambu, S.O. and

Okoli, C.O. 2015. Anti-inflammatory activity of Buchholzia coriacea Engl. (Capparaceae) leaf extract: evaluation of components of the inflammatory response involved. *J. Complement. Integr. Med.;12 (2):153-8.*

Ezuruike, U.F. and Prieto, J.M. 2014. The use of plants in the traditional management of diabetes in Nigeria: Pharmacological and toxicological considerations. *Journal of Ethnopharmacology, 155: 857-924.*

Fahey, J.W. 2005. *Moringa oleifera*: A review of the medical evidence for its nutritional, therapeutic, and prophylactic properties. *Part 1. Trees for Life Journal a forum on beneficial trees and plants.*

Fang-Chui, C., Szu-Chuan, S. and James S.B.W. 2009. Effect of Guava (*Psidium guajava* L.) leaf extract on glucose uptake in rat hepatocytes. *Journal of Food Science; 74 (5): 132-138.*

Fasola, T. R., Adeyemo, F. A., Adeniji, J. A., & Okonko, I. O. 2011. Antiviral Potentials of *Enantia chlorantha* Extracts on Yellow Fever Virus. *Nature and Science;9(9): 99-105.*

Farzaei, M.H., Abbasabadi, Z., Ardekani, M.R.S., Rahimi, R. and Farzaei, F. 2013. Parsley: a review of ethnopharmacology, phytochemistry and biological activities. *Journal of Traditional Chinese Medicine 15; 33(6): 815-826.*

Fernand, V.E., Dinh, D.T., Washington, S.J., Fakayode, S.O., Losso, J.N., van Ravenswaay, R.O. and Warner, I.M. 2008. Determination of pharmacologically active compounds in root extracts of *Cassia alata* L. by use of high performance liquid chromatography. *Talanta; 74: 896-902.*

Ferreira, S.F., Azevedo, S.C.S.F., Vardanega-Peicher, M., Pagadigorria, C.L.S., Garcia, R.F. 2013. Anti-hyperglycemic effect of *Quassia amara* (Simaroubaceae) in normal and diabetic rats. *Rev. Bras. Pl. Med., Campinas; 15 (3): 368-372.*

Feuya Tchouya, G.R., Souza, A., Tcouankeu, J.C., Yala, J.-F., Boukandou, M., Foundikou, H.,

Nguema Obiang, G.D., Fekam Boyom, F., Mabika Mabika, R., Zeuko'o Menkem, E., Tantoh Ndinteh, D. and Lebibi, J. 2015. Ethnopharmacological surveys and pharmacological studies of plants used in traditional medicine in the treatment of HIV/AIDS opportunistic diseases in Gabon. *Journal of Ethnopharmacology; 162: 306-316.*

Feuya Tchouya, G.R. and Nantia, E.A. 2015. Phytochemical analysis, antioxidant evaluation and total phenolic content of the leaves and stem bark of *Musanga cecropioides* R.Br. ex Tedlie (Cecropiaceae), growing in Gabon. *Journal of Pharmacognosy and Phytochemistry; 3(5): 192-195.*

Fondjo, F.A, Kamgang, R., Essame Oyono, J.L. and Ngongang Yonkeu., J. 2012. Anti-dyslipidemic and antioxidant potentials of methanol extract of *Kalanchoe crenata* whole plant in streptozotocin-induced diabetic nephropathy in rats. *Tropical Journal of Pharmaceutical research; 11(5): 767-775.*

Fongang, A.L.M., Nguemfo, E.L., Nangue, Y.D., Zangueu, C.B., Fouokeng, Y., Azebaze, A.G.B., Llorent-Martínez, E.J., Fernández-de Córdova, M.L., Dongmo, A.B. and Vierling, W. 2017. Antinociceptive and anti-inflammatory effects of the methanolic stem bark extract of *Antrocaryon klaineanum* Pierre (Anacardiaceae) in mice and rat. *Journal of Ethnopharmacology; 203: 11-19.*

Fotio, A.L., Nguelefack, T.B., Dimo, T., Asongale, E.A. and Kamtchoulng, P. 2004. Acute and chronic antinflamatory properties of *Kalanchoe crenata* Andr. (Crassulaceae) extracts. *Pharm. Méd. Trad. Afr.; 13 :57-66.*

Fred-Jaiyesimi, A.A., Adepoju, A. and Egbebunmi, O. 2011. Anthelmintic activities of chloroform and methanol extracts of Buchholzia coriacea Engler seed. *Parasitol Res.; 109 (2) :441-4.*

Fuangchan, A., Sonthisombat, P., Seubnukarn, T., Chanouan, R., Chotchaisuwat, P., Sirigulsatien,

V., Ingkaninan, K. Plianbangchang, P. 2011. Hypoglycemic effect of bitter melon compared with metformin in newly diagnosed type 2 diabetes patients. *Journal of Ethnopharmacology; 134: 422-428.*

Gajalakshmi, S., Vijayalakshmi, S. and Devi, R. V. 2013. Pharmacological activities of *Catharanthus roseus*: a perspective review. *Int. J. Pharm. Bio. Sci.; 4(2): 431 – 439.*

Gandhare, B., Kavimani, S., and Rajkapoor, B. 2013. Acute and subacute toxicity study of methanolic extract of *Ceiba pentandra* (Linn.) Gaertn. on Rats. *J. Sci. Res.; 5 (2) :315-324.*

Ganesh, T., Saikat, S., Thilagan, E., Thamotharan, G., Loganathan, T. and Raja, C. 2010. Pharmacognostic and anti-hyperglycemic evaluation of *Lantana camara* var. aculeate leaves in alloxan-induced hyperglycemic rats. *Int. J. Res. Pharm. Sci.; 1(3): 247-252.*

Ganiyu, O., Adelusi, T.I., Ayodele, J.A. and Richard, A.A. 2014. Inhibition of key enzymes linked to type 2 diabetes and sodium nitroprusside induced lipid peroxidation in rats' pancreas by phenolic extracts of avocado pear leaves and fruit. *International Journal of Biomedical Science; 10(3): 208-2016.*

Gbadegesin, M.A., Adegoke, A.M., Ewere, E.G. and Odunola, O.A. 2014. Hepatoprotective and anticlastogenic effects of ethanol extract of *Irvingia gabonensis* (IG) leaves in sodium arsenite-induced toxicity in male Wistar rats. *Niger. J. Physiol. Sci.; 29 :029 –036.*

Gboeloh, L.B., Okon, O.E., and Udoh, S.E. 2014. Antiplasmodial Effect of *Anthocleista vogelii* on albino mice experimentally infected with *Plasmodium berghei berghei* (NK 65). *Journal of Parasitology Research.*

Gbolade, A. 2012. Ethnobotanical study of plants used in treating hypertension in Edo state of Nigeria. Journal of Etthnopharmacology; 144: 1-10.

Gemede, H.F., Ratta, N., Haki, G.D. and Beyene, A.Z.W.F. 2014. Nutritional Quality and Health

Benefits of Okra (*Abelmoschus Esculentus*): A Review. *Global Journal of Medical Research (K);14 (5).*

Gharagozloo, M. and Ghaderi, A. 2001. Immunomodulatory effect of concentrated lime juice extract on activated human mononuclear cells. *Journal of Ethnopharmacology; 77 (1) :85–90.*

Ghiware, N.B., Aseemuddin, N., Kawade, R.M. and Vadvalkar, S.M. 2012. Pharmacological exploration Of *Saccharum officinarum* leave extracts for its anti-oxidant and anti-inflammatory activity. *International Journal of PharmTech Research; 4 (4): 1785-1791.*

Gidado, A., Ameh, D.A. and Atawodi, S.E. 2005. Effect of *Nauclea latifolia* leaves aqueous extracts on blood glucose levels of normal and alloxan-induced diabetic rats. *African Journal of Biotechnology; 4 (1): 91-93.*

Gidado, A., Ameh, D.A., Atawodi, S.E., Ibrahim, S., 2012. A preliminary study of the mechanism of hypoglycaemic activity of Nauclea latifolia leaf ethanolic extract. *Journal of Complementary and Integrative Medicine 9, 1–11.*

Goel, R.K., Prabha, T., Kumar, M.M., Dorababu, M., Prakash and Singh, G. 2006. Teratogenicity of *Asparagus racemosus* Willd. Root, a herbal medicine. *Indian J. Exp. Biol.; 44 (7) :570-573.*

Gomez-Flores, R., Arzate-Quintana, C., Quintanilla-Licea, R. and Tamez-Gue, P. 2008. Antimicrobial activity of *Persea americana* Mill (Lauraceae) (avocado) and *Gymnosperma glutinosum* (Spreng.) less (Asteraceae) leaf extracts and active fractions against *Mycobacterium tuberculosis*. *American-Eurasian Journal of Scientific Research; 3 (2): 188-194.*

Gondi, M. and Prasada Rao, U.J.S. 2015. Ethanol extract of mango (*Mangifera indica* L.) peel inhibits alpha-amylase and alpha-glucosidase activities, and ameliorate diabetes related biochemical parameters in streptozotocin (STZ)-induced diabetic rats. *Journal of Food science and Technology; 52: pp 7883-7893.*

Goutarel, R., Gollnhofer, O. and Sillans, R. 1993. Pharmacodynamics and therapeutic applications of Iboga and ibogaine. *Psychedelic Monographs and essays; 6: 70-111.*

Grover, J.K. and Yadav, S.P. 2004. Pharmacological actions and potential uses of *Momordica charantia*: a review. *Journal of Ethnopharmacology; 93 (1): 123–132.*

Gupta, P., Bala, M., Gupta, A., Dabur, R., Injeti, E. and Mittal, A. 2016. Efficacy and risk profile of anti-diabetic therapies: Conventional vs traditional drugs-A mechanistic revisit to understand their mode of action. *Pharmacological Research; 113: 636-674.*

Gutierrez, R.M.P., Mitchell, S. and Solis, R.V. 2008. *Psidium guajava*: A review of its traditional uses: Phytochemistry and pharmacology. *Journal of Ethnopharmacology; 117: 1–27.*

Halim, S. Z., Abdullah, N. R., Afzan, A. B., Abdul Rashid, A., Jantan, I. and Ismail, Z. 2011. Acute toxicity study of *Carica papaya* leaf extract in Sprague Dawley rats. *J. Med. Plant. Res.; 5: 1867-1872.*

Hamzah, R.U., Odetola, A.A., Erukainure, O.L. and Oyagbemi, A.A. 2012. *Peperomia pellucida* in diets modulates hyperglycemia oxidative stress and dyslipidemia in diabetic rats. *Journal of Acute Disease; 1(2):135-140.*

Hanisa, H., Hadijah, A., Rasedee and Tarmizi, A.S. 2011. Sub-acute oral administration of *Cymbopogon citratus* stem infusion and its effects on blood biochemical parameters, body and organ weights in rats. *J. Trop. Agric. And Fd. Sc.; 39(1).*

Hannan, J.M.A., Ali, L., Khaleque, J., Akhter, M., Flatt, P.R. and Abdel-Wahab, Y.H.A. 2012. Antihyperglycaemic activity of *Asparagus racemosus* roots is partly mediated by inhibition of carbohydrate digestion and absorption, and enhancement of cellular insulin action. *British Journal of Nutrition; 107: 1316-1323.*

Hansen, D.K., George, N.I., White, G.E., Abdel-Rahman, A., Pellicore, L.S. and Fabricant, D.

2013. Cardiovascular toxicity of *Citrus aurantium* in exercised rats. *Cardiovasc Toxicol.; 13(3):208-19.*

Harker, K.W. and Gourlay, R.N. 1962. *Bersama abyssinica* poisoning the effects of a purified extract on cattle. *J Comp Pathol.; 72: 308-15.*

Harlita, N.H., Niken, S., Mammed, S. and Pudji, A. 2016. Acute Toxicity of Cashew Nut Shell Extract (*Anacardium occidentale* L.) In Albino Rat (*Rattus norvegicus* Berkenhout 1769). *Pakistan Journal of Biological Sciences, 19: 89-94.*

Helfer, M., Koppensteiner, H., Schneider, M., Rebensburg, S., Forcisi, S., Müller, C. et al. 2014. The root extract of the medicinal plant Pelargonium sidoides is a potent HIV-1 attachment inhibitor. *PLOS ONE; 9 (1).*

Hiransai, P., Tangpong, J., Kumbuar, C., Hoonheang, N., Rodpech, O., Sangsuk, P. Kajklangdon, U. and Inkaow, W. 2016. Anti-nitric oxide production, anti-proliferation and antioxidant effects of the aqueous extract from *Tithonia diversifolia*. *Asian Pacific Journal of Tropical Biomedicine; 6 (11): 950-956.*

Hossain, M. S., Sokeng, S., Shoeb, M., Hasan, K., Mosihuzzaman, M., Nahar, N., Ali, L., and Rokeya, B. 2012. Hypoglycemic effect of *Irvingia gabonensis* (Aubry-Lacomate Ex. Ororke), Baill in Type 2 Diabetic Long-Evans Rats. *J. Pharm. Sci.* 11(1): 19-24.

Houël, E, Bertani, S., Bourdy, G., Deharo, E., Jullian, V., Valentin, A., Chevalley, S. and Stien, D. 2009. Quassinoid constituents of Quassia amara L. leaf herbal tea. Impact on its antimalarial activity and cytotoxicity. *Journal of Ethnopharmacology; 126: 114-118.*

Houghton, P.J., Hylands, P.J., Mensah, A.Y., Hensel, A. and Deters, A.M. 2005. *In-vitro* tests and ethnopharmacological investigations: wound healing as an example. *J. Ethnopharmacol.; 100 (1-2): 100-107.*

Huang, B., Wang, Z., Parka, J.H., Ryu, O.H., Choi, M.K., Lee, J.Y., Kang, Y.H. and Lim, S.S. 2015. Anti-diabetic effect of purple corn extract on C57BL/KsJ db/db mice. *Nutrition Research and Practice; 9(1): 22-29.*

Huang, L., Chen, S. and Yang, M. 2012. *Euphorbia hirta* (Feiyangcao): A review on its ethnopharmacology, phytochemistry and pharmacology. *Journal of Medicinal Plants Research; 6 (39): 5176-5185.*

Husain, G.M., Singh, P.N., Singh, R.K. and Kumar, V. 2011. Antidiabetic activity of standardized extract of *Quassia amara* in Nicotinamide-Streptozotocin-induced diabetic rats. *Phytotherapy Research; 25: 1806-1812.*

Husin, N.N.A., Balkis, B.S., Hamid, Z.A., Rahman, M.A., Louis, S.R., Osman, M., Idris, M.H. and Mohamed, J. 2017. Aqueous calyxes extract of Roselle of *Hibiscus sabdariffa* Linn supplementation improves liver morphology in streptozotocin induced diabetic rats. *Arab Journal of Gastroentereoly; 18: 13-20.*

Husna, R. N., Noriham, A., Nooraain, H., Azizah, A. H. and Farah Amna, O. 2013. Acute Oral Toxicity Effects of *Momordica Charantia* in Sprague Dawley Rats. *International Journal of Bioscience, Biochemistry and Bioinformatics; 3(4): 408-403.*

Ibibia, E.T., Peter, O., and Olugbemiga, O.S. 2015. Evaluation of some nigerian savannah plants for antioxidant activity, and total phenolic and flavonoid contents. *Int. J. Pharm. Sci. Rev. Res.; 34 (2): 75-81.*

IDF Diabetes Atlas 5th Ed, 2011. www.idf.org/diabetesatlas/5e/africa. Igbe, I., Silvanus, I., Stephen, V.O. and Amamina, L. 2015. Chronic Toxicity Studies of Aqueous Leaf Extract of *Voacanga africana* in Wistar Rats. *J. Appl. Sci. Environ. Manage.;19 (4) 639 – 646.*

Ihedioha, T.E., Omoja, V. and Asuzu, I.U. 2014. Effects of methanol stem bark extract of *Cassia sieberiana* DC on fasting blood glucose and serum lipid profile of alloxan induced diabetic rats. *Unisersity of Nigeria.*

Ilavarasan, R., Moni, M. and Subramanian, V. 2011. Toxicological assessment of *Ricinus communis* Linn root extracts. Toxicology Mechanisms and Methods; 21(3) :246-250.

Iliemene, U.D., Shekins, O.O., Eze, E.D. and Liman, L.M. 2014. Phytochemical constituents and antidiabetic property of *Cola nitida* seeds on alloxan induced diabetes mellitus in rats. *British Journal of Pharmaceutical Research; 4 (23): 2631-2641.*

Ilodigwe, E.E. and Akah, P.A. 2009. *Spathodea campanulata*: an experimental evaluation of the analgesic and anti-inflammatory properties of a traditional remedy. *Asian Journal of Medical Sciences; 1 (2): 35-38.*

Ilodigwe, E.E., Akah, P.A. and Nworu, C.S. 2010. Anticonvulsant activity of ethanol leaf extract of *Spathodea campanulata* P. Beauv (Bignoniaceae). *J. Med. Food.; 13(4) :827-33.*

Ilusanya, O.A.F., Odunbaku, O.A., Adesetan, T.O. and Amosun, O.T. 2012. Antimicrobial activity of fruit extracts of *Xylopia Aethiopica* and its combination with antibiotics against clinical bacterial pathogens. *Journal of Biology, Agriculture and Healthcare; 2 (9).*

International Diabetes Federation. In: Unwin N, Whiting D, Guariguata L, Ghyoot G, Gan D, Eds. Updated diabetes atlas 20111. 5th ed. Brussels, 2011.

Inya-Agha, S.I., Ezea, S.C. and Odukoya, O.A. 2006. Evaluation of *Picralima nitida* hypoglycemic activity, toxicity and analytical standards. *Planta Med; 72 :25.*

Iroanya, O., Oduola, T., Akagha, M. and Oladunjoye, E. 2015. Pharmacological properties of *Anthocleista vogelii* against CCl_4 induced toxicity. *FASEB J.; 29 (1).*

Iroanya, O.O., Okpuzor, J.E., Mbagwu, H. and Ojobo, P.D. 2009. Analgesic properties of an indigenous polyherbal preparation. *The FASEB Journal 23.*

Irondi, E.A., Oboh, G. and Akindahunsi, A.A. 2016. Antidiabetic effects of *Mangifera indica* Kernel flour-supplemented diet in streptozotocin-induced type 2 diabetes rats. *Food Science & Nutrition; 4(6): 828-839.*

Ishola, I.O., Ashorobi, R.B. and Adeoluwa, O. 2012. Evaluation of the antinociceptive activities of the aqueous root extract of *Alchornea cordifolia* (Schumach and Thonn) Müll. Arg. (Euphorbiaceace). *International Journal of Applied Research in Natural Products; 5 (3): 37-42.*

Iwu, M.M. 2014. Handbook of African Medicinal Plants. CRC Press, Inc., London, 19.

Iyamah, P.C. and Idu, M. 2015. Ethnomedicinal survey of plants used in the treatment of malaria in Southern Nigeria. *Journal of Ethnopharmacology; 173: 287-302.*

Jaiswal YS, et al., Antidiabetic activity of extracts of Anacardium occidentale Linn. leaves on n-streptozotocin diabetic rats, Journal of Traditional and Complementary Medicine (2016), http://dx.doi.org/10.1016/j.jtcme.2016.11.007

Jana, T.K., Das, S., Ray, A., Mandal, D., Giri, S. and Bhattacharya, J. 2013. Study of the effects of *Hibiscus rosa-sinensis* flower extract on the spermatogenesis of male albino rats. *J. Phys. Pharm. Adv.; 3 (6): 168-171.*

Jawonisi, I.O. and Adoga, G.I. 2015. Hypoglycaemic and hypolipidaemic effect of extract of *Lantana camara* Linn. leaf on alloxan diabetic rats. *Journal of Natural Sciences Research; 5(6).*

Juárez-Rojop, I.E., Díaz-Zagoya, J.C., Ble-Castillo, J.L., Miranda-Osorio, P.H., Castell-Rodríguez, A.E., Tovilla-Zárate, C.A., Rodríguez-Hernández, A., Aguilar-Mariscal, H., Ramón-Frías, T. and Bermúdez-Ocaña, D.Y. 2012. Hypoglycemic effect of *Carica papaya* leaves in streptozotocin-

induced diabetic rats. *BMC Complementary & Alternative Medicine; 12: 236.*

Juárez-Rojop, I.E., Tovilla-Zárate, C.A, Aguilar-Domínguez, D.E., Roa-de la Fuente, L.F., Lobato-García, C.E., Blé-Castillo, J.L., López-Meraz, L., Díaz-Zagoya, J.C. and Bermúdez-Ocaña, D.Y. 2014. Phytochemical screening and hypoglycemic activity of *Carica papaya* leaf in streptozotocin-induced diabetic rats. *Revista Brasileira de Farmacognosia; 24: 341-347.*

Kadima, J.N., Kasali, F.M., Bavhure, B., Mahano, A.O. and Bwironde, F.M. 2016. Comparative antidiabetic potential and survival function of *Harungana madagascariensis*, *Physalis peruviana*, *Solanum americanum* and *Tithonia diversifolia* extracts on alloxan-induced diabetes in guinea-pigs. *International Journal of Pharmacy and Pharmaceutical Research; 5(3).*

Kagbo, H. and Ejebe, D. 2009. Phytochemistry and preliminary toxicity studies of the methanol extract of the stem bark of *Garcinia kola (Heckel). The Internet Journal of Toxicology; 7 (2).*

Kaiser, P., Youssouf, M.S., Tasduq, S.A., Singh, S., Sharma, S.C., Singh, G.D., Gupta, V.K., Gupta, B.D. and Johri, R.K. 2009. Antiallergic effects of herbal product from *Allium cepa* (bulb). *J. Med. Food, 12(2): 374-82.*

Kamagate, M., N'Goran, M.K., Koffi, E., Amani, B.K., Koffi, C., N'Guessan, A.R.Y., Balayssac, E. Daubrey-Potey, T., N'zoue, K.S. and Die-Kacou. H.M. 2016. Acute toxicity and hypoglycaemic activity of the leaf extracts of *Persea americana* Mill. (Lauraceae) in Wistar rats. *Afr. J. Pharm. Pharmacol.; 10(33): 690-698.*

Kamble, B., Gupta, A., Moothedath, I., Khatal, L., Janrao, S., Jadhav, A. and Duraiswamy, B. 2016. Effects of *Gymnema sylvestre* extract on the pharmacokinetics and pharmacodynamics of glimepiride in streptozotocin induced diabetic rats. *Chemico-Biological Interactions: 245: 30-38.*

Kamboj, A. and Saluja, A.K. 2008. *Ageratum conyzoides* L.: A review on its phytochemical and pharmacological profile. *Int. J. Green. Pharm.; 2 (2): 59-68.*

Kamgang, R, Mboumi, R.Y., Fondjo, A.F., Tagne, M.A., N'dillé, G.P. and Yonkeu, J.N. 2008. Antihyperglycaemic potential of the water-ethanol extract of *Kalanchoe crenata* (Crassulaceae). *J Nat Med.; 62 (1): 34-40.*

Kamgang, R., Foyet, A.F., Essame, J.L.O. and Ngogang, J.Y. 2012. Effect of methanolic fraction of *Kalanchoe crenata* on metabolic parameters in adriamycin-induced renal impairment in rats. Indian J Pharmacol.; 44 (5): 566–570.

Kamgang, R., Foyet Fondjo, A. and Essame Oyono, J.L. 2015. Effect of methanol fraction of *Kalanchoe crenata* on renal morphophysiology in adriamycin-induced impaired kidney in rats. *International Journal of Pharmacy and Pharmaceutical Sciences; 7(2): 89-93.*

Kamgang, R., Youmbi Mboumi, R., Foyet Fondjo, A., FokamTagne, M.A., Mengue N'dillé, G.P.R., Ngogang Yonkeu, J. 2008. Antihyperglycaemic potential of water-ethanol extract of *Kalanchoe crenata* (Crassulaceae). *J. Nat. Med.; 62(1): 34-40.*

Kamtchouing, P., Sokeng, S.D., Moundipa, P.F, Watcho, P., Jatsa, H.B. and Lontsi, D. 1998. Protective role of *Anacardium occidentale* extract against streptozotocin-induced diabetes in rats. *Journal of Ethnopharmacology; 62: 95-99.*

Kanagavalli, U., Bhuvaneshwari, B. and Sadiq, M.A. 2015. Anti-diabetic activity of *Boerhaavia diffusa* against alloxan-induced diabetic rats. *International Journal of Pharma and Bio Sciences; 6(5): (B) 1215-1219.*

Karimi, A. and Nasab, N.K. 2014. Effect of garlic extract and *Citrus aurantifolia* (lime) juice on blood glucose level and activities of aminotransferase enzymes in streptozotocin-induced diabetic rats. *World Journal of Pharmaceutical Sciences; 2(8): 821-827.*

Karimi, E., Oskoueian, E., Hendra, R., Oskoueian, A. and Jaafar, H.Z.E. 2012. Phenolic compounds characterization and biological activities of *Citrus aurantium* Bloom. *Molecules;*

17 :1203-1218.

Karioti, A., Hadjipavlou-Litina, D., Mensah, M.L., Fleischer, T.C. and Skaltsa, H. 2004. Composition and antioxidant activity of the essential oils of *Xylopia aethiopica* (Dun) A. Rich. (Annonaceae) leaves, stem bark, root bark, and fresh and dried fruits, growing in Ghana. *J Agric Food Chem.; 52 (26) :8094-8.*

Kasolo, J.N., Bimenya, G.S., Ojok L. and Ogwal-Okeng, J.W. 2012. Sub-acute toxicity evaluation of *Moringa oleifera* leaves aqueous and ethanol extracts in Swiss Albino rats. *International Journal of Medicinal Plant Research; 1 (6): 75-81*.

Kathirvel, A. and Sujatha, V. 2012. Phytochemical studies of *Cassia occidentalis* Linn. flowers and seeds in various solvent extracts. *International Journal of Pharmacognosy and Phytochemical Research; 3(4): 95-101.*

Kazeem, M.I. and Ashafa, A.O.T. 2015. Inhibitory effect of Alstonia boonei (Apocynaceae) leaf extracts on key enzymes linked to diabetes mellitus. *South African Journal of Botany, 98: 182.*

Kazeem, M.I., Ogunbiyi, J.V. and Ashafa, A.O.T. 2013. In vitro studies on the inhibition of alpa-amylase and alpha-glucosidase by leaf extracts of *Picralima nitida* (Stapf). *Tropical Journal of Pharmaceutical research; 12(5): 719-725.*

Kengni F., Fodouop, S.P.C., Donald S. Tala, D.S., Merline N. Djimeli, M.N., Charles Fokunang, C., Gatsing, D. 2016. Antityphoid properties and toxicity evaluation of *Harungana madagascariensis* Lam (Hypericaceae) aqueous leaf extract. *Journal of Ethnopharmacology; 179: 137–145.*

Kengni, F., Tala, D.S., Djimeli, M.N., Fodouop, S.P.C., Kodjio, N., Magnifouet, H.N. and Gatsing, D. 2013. In vitro antimicrobial activity of *Harungana madagascriensis* and *Euphorbia prostrata* extracts against some pathogenic *Salmonella* sp. *Int. J. Biol. Chem. Sci.; 7(3): 1106-1118.*

Khan, A. 2016. A comparative study of anti-diabetic activity of *Catharanthus roseus* and *Catharanthus alba* flower extracts on alloxan induced diabetic rats. *World Journal of Pharmacy and Pharmaceutical Sciences; 5(2): 527-543.*

Khatun, H., Rahman, A., Biswas, M., and Ul Islam, A. 2011. Water-soluble fraction of *Abelmoschus* esculentus L interacts with glucose and metformin hydrochloride and alters their absorption kinetics after coadministration in rats. *International Scholarly Research Network pharmaceutics.*

Khodabakhsh, P., Shafaroodi, H. and Asgarpanah, J. 2015. Analgesic and anti-inflammatory activities of *Citrus aurantium* L. blossoms essential oil (neroli): involvement of the nitric oxide/cyclic-guanosine monophosphate pathway. *J. Nat. Med.; 69 (3): 324-31*.

Kim. T.H., Kim, J.K., Kang, Y.H., Lee, J.Y., Kang, I.J. and Lim, S.S. 2013. Aldose reductase inhibitory activity of compounds from *Zea mays* L. *BioMed Research International.*

Kolawole, O. T., Akanji, M. A. and Akiibinu M. O. 2013. Toxicological assessment of ethanolic extract of the leaves of *Newbouldia laevis* (P. Beauv). *American Journal of Medicine and Medical Sciences; 3(4): 74-80*.

Konan, N. A. and Bacchi, E.M. 2007. Antiulcerogenic effect and acute toxicity of a hydroethanolic extract from the cashew (*Anacardium occidentale* L.) leaves. *J Ethnopharmacol.;112 (2): 237-42.*

Konziase, B. 2015. Protective activity of biflavanones from *Garcinia kola* against Plasmodium infection. *J. Ethnopharmacol.; 172: 214-8.*

Kothari, S.C., Shivarudraiah, P., Venkataramaiah, S.B., Gavara, S. and Soni, M.G. 2012. Subchronic toxicity and mutagenicity/genotoxicity studies of *Irvingia gabonensis* extract (IGOB131). *Food and Chemical Toxicology; 50: 1468-1479.*

Kottarapat, J., Vijayastelter, B.L., and Ramadasan, K. 2011. A prliminary 13-week oral toxicity

study of ginger oil in male and female wistar rats. *International Journal of Toxicology*; *30 (6) :662-670.*

Kouadio, J.H., Bleyere, M.N., Kone, M. and Dano, S.D. 2014. Acute and sub-acute toxicity of aqueous extract of *Nauclea latifolia* in Swiss mice in OFA rats. *Tropical Journal of Phramaceutical Research; 13(10): 109-115.*

Kouakou, K., Schepetkin, I.A., Yapi, A., Kirpotina, L.N., Jutila, M.A. and Quinn, M.T. 2013. Immunomodulatory activity of polysaccharides isolated from *Alchornea cordifolia*. *J Ethnopharmacol.; 146 (1): 232–242.*

Kouitcheu Mabeku, L.B., Kouam, J., Paul, A., Etoa, F.X., 2008. Phytochemical screen- ing and toxicological profile of methanolic extract of Picralima nitida fruit-rind (Apocynaceae). Toxicological and Environmental Chemistry 90, 815–828.

Koudou, J., Obame, LC., Kumulungui, B.S., Edou, P., Figueredo, G., Chalchat, JC. and Traore, A.S. 2009. Volatile constituents and antioxidant activity of *Aucoumea klaineana* Pierre essential oil. *African Journal of Pharmacy and Pharmacology; 3(6): 323-326.*

Krishna, K., Paridhavi, M. and Patel, J.A. 2008. Review on nutritional, medicinal and pharmacological properties of papaya (*Carica papaya* Linn.). *Nat Prod Radian; 7: 364- 373.*

Kubilienė, A., Marksienė, R., Kazlauska, S., Sadauskienė, I., Ražukas, A. and Ivanov, L. 2008. Acute toxicity of ibogaine and noribogaine. *Medicina; 44(12).*

Kubo, I., Ochi, M., Vieira, P.C. and Komatsu, S. 1993. Antitumor agents from the cashew (*Anacardium occidentale*) apple juice. *J. Agric. Food Chem.; 41 (6): 1012–1015*.

Kuete, V. and Efferth, T. 2010. Cameroonian medicinal plants: pharmacology and derived natural products. *Frontiers in Pharmacology; 1: 123.*

Kuete, V., Tankeo, S.B., Saeed, M.E.M., Wiench, B., Tane, P. and Efferth, T. 2014. Cytotoxicity

and modes of action of five Cameroonian medicinal plants against multi- factorial drug resistance of tumor cells. *Journal of Ethnopharmacology, 153: 207-219.*

Kuete, V., Wabo, G.F., Ngameni, B., Mbaveng, A.T., Metuno, R., Etoa, F.X., Ngadjui, B.T., Beng, V.P., Meyer, J.J. and Lall, N. 2007. Antimicrobial activity of the methanolic extract, fractions and compounds from the stem bark of *Irvingia gabonensis* (Ixonanthaceae). *J. Ethnopharmacol.; 114(1):54-60.*

Kulkarni, M., Singhal, R.G., Bhise, K. and Tambe, R. 2014. Phytochemical screening, HPTLC studies and screening of antioxidant activity of extracts of leaves of *Spathodea campanulata. Journal of Pharmacognosy and Phytochemistry; 3(1): 8-13.*

Kumar S. 2014. Physicochemical, Phytochemical and toxicity studies on gum and mucilage from plant *Abelmoschus esculentus*. *The Journal of Phytopharmacology; 3(3): 200-203.*

Kumar, S., Malhotra, R. and Kumar, D. 2010. *Euphorbita hirta:* Its chemistry, traditional and medicinal uses, and pharmacological activities. *Pharmacognosy Review; 4(7): 58-61*.

Kumar, V., Mahdi, F., Khanna, A.K., Singh, R., Chander, R., Sanexa, J.K., Mahdi, A.A. and Singh. R.K. 2013. Antidyslipidemic and antioxidant activities of *Hibiscus rosa sinensis* root extract in alloxan induced diabetic rats. *Ind. J. Clin. Biochem.; 28(1): 46-50.*

Kupchan, S.M. and Streelman, D.R. 1976. Quassimarin, a new antileukemic quassinoids from *Quassia amara*. J Org Chem; 41:3481.

Lakshmi, R., Supraja, M., Mounika, M. and Srinivasa Babu, P. 2016. A review on hypoglycaemic activity of different extracts of various medicinal plants. *International Journal of Pharmaceutical Sciences and research; 2: 3173-3184.*

Lakshmi, V., Agarwal, S.K., Ansari, J.A., Madhi, A.A., Srivastava, A.K. 2014. Antidiabetic potential of *Musa paradisiaca* in streptozotocin-induced diabetic rats. *The Journal of*

Phytopharmacology; 3(2): 77-81.

Lakshmi, V., Agarwal, S.K., Ansari, J.A., Mahdi, A.A. and Srivastava, A.K. 2014. Antidiabetic potential of *Musa paradisiaca* in Streptozotocin- induced diabetic rats. *The Journal of Phytopharmacology; 3(2): 77-81.*

Lamidi, M., Ollivier, E., Faure, R., Debrauwer, L., Nze-Ekekang, L. and Balansard, G. 1995. Quinovic acid glycosides from Nauclea diderrichii. *Phytochemistry; 38 (1): 209-2012.*

Lather, A., Gupta, V., Tyagi, V., Kumar, V. and Garg, S. 2010. Phytochemistry and pharmacological activities of *Bersama engleriana* Guerke - An overview. *International Research Journal of Pharmacy; 1(1): 89-94.*

Lawal B., Oluwatosin, K. S., Oibiokpa, F. I., Mohammed, A., Sheriff, I. U., Garba, M. H. 2016. Antimicrobial evaluation, acute and sub-acute toxicity studies of *Allium sativum*. Journal of Acute Disease; 5(4): 296–301.

Lawal, H.O., Etatuvie, S.O. and Fawehinmi, A.B. 2012. Ethnomedicinal and Pharmacological properties of *Morinda lucida*. *Journal of Natural Products; 5:93-99.*

lawson-Evi, P., Eklu-Gadegbeku, K., Agbonon, A., Aklikokou, K., Moukha, S., Creppy, E.E. and Gbéassor, M. 2008. Toxicological assessment on extracts of *Phyllantus amarus* Schum and Thonn. *Scientific Research and Essay; 3(9): 410-415.*

Leach, M.J. 2007. *Gymnema sylvestre* for diabetes mellitus: A systematic review. *The Journal of Alternative and Complementary Medicine; 13(9); 977-983.*

Lee, C.-H., Garcia, H.S., Parkin, K.L., 2010. Bioactivities of kernel extracts of 18 strains of maize (Zea mays). *Journal of Food Science 75, C667–C672.*

Leite, J.R., Seabra, M.D.L.V., Maluf, E., Assolant, K., Suchecki D., Tufik, S., Klepacz, S., Calil, H.M. and Carlini, E.A. 1986. Pharmacology of lemongrass (*Cymbopogon citratus* Stapf), III.

Assessment of eventual toxic, hypnotic and anxiolytic effects on humans. *Journal of Ethnopharmacology; 17: 75-83.*

Lembè, D.M., Njoh Njoh, L.E., Bend, E.F., Koloko, B.L., Oundoum Oundoum, P.C., Njila, M.I. N., Kenmogne, H., Hambe, C.M., Tchamadeu, M.C., Domkam, J., Dimo, T. and Gonzales, G.F. 2014. Antifertility effects of aqueous roots extract of *Alchornea cordifolia* (Euphorbiaceae) on female albino rats. *Pharmacology & Pharmacy; 5: 838-845*.

Li, Y., Tran, V.H., Kota, B.P., Nammi, S., Duke, C.C. and Roufogalis, B.D. 2014. Preventative effect of *Zingiber officinale* on insulin resistance in a high-fat high-carbohydrate diet-fed rat model and its mechanism of action. *Basic & Clinical Pharmacology & Toxicology*; *115: 209-215*.

Lienou Lienou, L., Telefo, B.P., Nangue, C., Bayala, B., Chekem Goka, S., Mefokou Yemele, D., Simo Tagne, R., Jiatsa Donfack, N., Tetaping Mbemya, G. and Ribeiro Rodrigues, A.P. 2015. Comparative effects of the crude methanol/methylene chloride extract and fractions of *Senecio biafrae* (Oliv. & Hiern) J. Moore on some fertility parameters in immature female Wistar rats. *Asian Pacific Journal of Tropical Disease; 5(5): 404-411.*

Lima, C.R., Vasconcelos, C.F.B., Costa-Silva, J.H., Maranhão, C.A., Costa, J., Batista, T.M, Carneiro, E.M, Soares, L.A.L., Ferreira, F. and Wanderley. A.G. 2012. Anti-diabetic activity of extract from *Persea americana* Mill. leaf via the activation of preotein kinase B (PKB/Akt) in streptozotocin-induced diabetic rats. *Journal of Ethnopharmacology; 141: 517-525.*

Liu, W., Di Giorgio, C., Lamidi, M., Elias, R., Ollivier, E. and De Méo, M.P. 2011. Genotoxic and clastogenic activity of saponins extracted from *Nauclea* bark as assessed by the micronucleus and the comet assays in chinese hamster ovary cells. *Journal of Ethnopharmacology; 137: 176-183.*

Lowe, H.I.C., Watson, C.T., Badal, S., Peart, P., Toyang, N.J. and Bryant, J. 2014. Promising

efficacy of the *Cola acuminata* plant: A mini review. *Advances in Biological Chemistry; 4: 240-245*.

Ludvik, B., Neuffer, B. and Pacini, G. 2004. Efficacy of *Ipomoea batatas* (Caiapo) on diabetes control in type 2 diabetic subjects treated with diet. *Diabetes Care; 27: 436-440.*

Ludvik, B., Waldhäusl, W., Prager, R., Kautzky-Willer, A. and Pacini, G. 2003. Mode of action of *Ipomoea batatas* (Caiapo) in type 2 diabetic patients. *Metabolism; 52(7): 875-880.*

Luka, C.D., Olatunde, A., Tijjani, H. and Olisa-Enewe, I.A. 2013. Effect of aqueous extract of *Phaseolus vulgaris* L. (red kidney beans) on alloxan-induced diabetic Wistar rats. *International Journal of Science Inventions Today; 2(4): 292-301*.

LYW, K., AH, H., Zhari, I. and Chin J.H. 2012. Sub-acute oral toxicity study of methanol leaves extract of *Catharanthus roseus* in rats. *Journal of Acute Disease; 38-41*.

Madingou, N.O.K., Souza, A., Lamidi, M., Mengome, L.E., Eyele Mve Mba, C., Bading, B., Mavoungou, J. and Traore, A.S. 2011. Study of medicinal plants used in the management of cardiovascular diseases at Libreville (Gabon): An ethnopharmacological approach. *International Journal of Pharmaceutical Sciences and Research; 3(1).*

Madingou, N. O. K., Traore, A., Souza, A., Boukandou Mounanga, M. M., Raissa Reine Aworet Samseny, R. R., Ouedraogo, S. 2016. Preliminary studies of acute and sub-chronic toxicity of the aqueous extract of *Guibourtia tessmannii* (Harms) J. Leonard stem barks (Caesalpiniaceae) in mice and rats. Asian Pac J Trop Biomed; 6(6): 506–510.

Mabeku, L.B. K., Penlap Beng, V., Kouam, J., Oyono, E. and Etoa, F.X. 2007. Toxicological evaluation of ethyl acetate extract of *Cylicodiscus gabunensis* stem bark (Mimosaceae). *Journal of Ethnopharmacology; 111: 598–606.*

Malviya, N., Jain, S. and Malviya, S. 2010. Antidiabetic potential of medicinal plants. *Acta*

Poloniae Pharmaceutica – Drug Research; 67 (2): 113-118.

Manga, H. M., Brkic, D., Marie, D.E.P. and Quetin-Leclercq, J. 2004. In vivo anti-inflammatory activity of *Alchornea cordifolia* (Schumach. & Thonn.) Müll. Arg. (Euphorbiaceae). *Journal of Ethnopharmacology; 92: 209–214.*

Maniyar, Y. and Bhixavatimath, P. 2012. Antihyperglycemic and hypolipidemic activities of aqueous extract of *Carica papaya* Linn. leaves in alloxan-induced diabetic rats. *Journal of Ayurveda and Integrative Medicine; 3(2): 70-74.*

Manjur, A.S., Begum, R., Abuzer, A., Krishna, K.P., Vidhu, A., Manju, S. and Showkat, R.M. 2015. Inhibition of alpha-glucosidase by new crenelated flavonoids from *Euphorbia hirta* L. herb. *Journal of Ethnopharmacology; 176: 1-8.*

Mann, S., Singh, P.K., Kumar Gupta, A. and Kumar Gupta, A. 2013. Antidiabetic effects of *Ricinus communis* on the blood biochemical parameters in streptozotocin induced albino rats. *International Journal of Pharma and Bio Sciences; 4(2): 382-388.*

Manum, A., Islam, S., Khurshid Alam, A.H.M., Md Rahman, A.A. and Rashid, M. 2013. Effects of ethanolic extract of *Hibiscus rosa-sinensis* leaves on alloxan-induced diabetes with dyslipidemia in rats. *Bangladesh Pharmaceutical Journal; 16(1): 27-31.*

Manvitha, K. and Bidya, B. 2014. Review on pharmacological activity of *Cymbopogon citratus*. *International Journal of Herbal Medicine; 1 (6): 5-7.*

Mardani, S., Khodadadi, S., Ahmadi, A., Kazemi, E. and Rafieian-kopaei, M. 2016. The effects of *Momordica charantia* on liver function and histological structure. *Ann Res Antioxid.; 1(1): 12.*

Mash, R.J., De Vries, E. and Abdul, I. 2007. Diabetes in Africa: the new pandemic. *SA Fam Pract; 49 (6).*

Mathur, R., Dutta, S., Velpandia, T. and Mathur, S.R. 2015. *Psidium guajava* Linn. leaf extract

affects hepatic glucose transporter-2 to attenuate early onset of insulin resistance consequent to high fructose intake: an experimental study. *Pharmacognosy Research; 7(2): 166-175.*

Matta, V.K., Pasala, P.K., Netala, S., Pandrinki, S. and Konduri, P. 2015. Anti-hypertensive activity of the ethanolic extract of *Lantana camara* leaves on high salt loaded Wistar albino rats. *Pharmacognosy Journal; 7 (5)*.

Maurya, A.K., Tripathi, S., Ahmed, Z. and Sahu, R.K. 2012. Antidiabetic and antihyperlipidemic effect of *Euphorbia hirta* in streptozotocin induced diabetic rats. *Der Pharmacia Lettre; 4 (2): 703-707.*

Mawoza, T., Tagwireyi, D. and Nhachi, C. 2016. Acute and sub-chronic toxicity studies of an aqueous stem bark extract of *Sclerocarya birrea* using a rat model. International Journal of Pharma Sciences and Research (IJPSR); 7 (1): 9-17.

Mbang, A.O., Moyosola, M.A., Promise, M.E., Smith, I.J., Martin, N. and Benjamin, O.S.D. 2010. Biochemichal and histologic changes in rats after prolonges administration of the crude aqueous extract of the leaves of Vitex grandifolia. *Pharmacognosy Res.; 2 (5): 273-278.*

Mbiantcha, M., Nguessom, K.O., Ateufack, G., Oumar, M. and Kamanyi, A. 2013. Analgesic properties and toxicological profile of aqueous extract of the stem bark of *Anthocleista vogelii* planch (Loganiaceae). *International Journal of Pharmaceutical, Chemical and Biological Sciences, 3(1), 1-12*.

Mebale, A-J. A., Dibama, M. H., Affane, A. L. N., Nzigou, M. S., Ollane, N. J., Ondo, J. A., and Eba, F. 2013. Phytochemical analyses of aqueous extracts of two medicinal plants from Gabon: Pseudospondias longifolia and Antrocaryon klaineanum. *Journal of Natural Sciences Research*, 3(9).

Mengome, L. E., Feuya Ntchoua, G. R., Eba, F., and Nsi-Emvo, E. 2009. Antiprolif erative effect

of alcoholic extracts of some Gabonese medicinal plants on human colonic cancer cells. *Afr. J. Trad. CAM;* 6 (2): 112 - 117.

Meschino, J.P. 2001. Policosanol (*Saccharum officinarum*): An effective natural supplement to lower cholesterol. *Dynamic Chiropractic; 32(1): 8-12.*

Mesia, K., Cimanga, R.K., Dhooghe, L., Cos, P., Apers, S., Totté, J., Tona, G.L., Pieters, L. et al., 2010. Antimalarial activity and toxicity evaluation of a quantified Nauclea pobeguinii extract. *Journal of Ethnopharmacology; 131: 10-16.*

Miao, M.S, Zhang, G.L, Miao, Y.Y. and Liu, H.L. 2008. Influence of *Zea mays* L. saponin (ZMLS) on ultrastructure of kidney and pancreas in diabetes rats induced by streptozocin. *China Journal of Chinese Materia Medica; 33(10): 1179-1183.*

Midawa, S.M., Ali, B.D., Mshelia, B.Z. and Johnson J. 2010. Cutaneous wound healing activity of the ethanolic extracts of the leaf of *Senna alata* l. (fabaceae). *Journal of Biological Sciences and Bioconservation; 2: 63-68.*

Milad, R., El-Ahmady, S. and Singab, A.N. 2014. Genus *Kalanchoe* (Crassulaceae): A review of its ethnobotanical, botanical, chemical and pharmacological properties. *European Journal of Medicinal Plants; 4(1): 86-104.*

Miranda-Osorio, P.H., Castell-Rodríguez, A.E., Vargas-Mancilla, J., Tovilla-Zárate, C.A., Ble-Castillo, J.L., Aguilar-Domínguez, D.E., Juárez-Rojop, I.E. and Díaz-Zagoya, J.C. 2016. Protective action of *Carica papaya* on beta-cells in streptozotocin-induced diabetic rats. *International Journal of Environmental Research and Public Health;13: 446.*

Mishra, R.K., Kumar, A., and Kumar, A. 2012. Pharmacological activity of *Zingiber officinale*. *International Journal of Pharmaceutical and Chemical Sciences; 1 (3).*

Miura, T., Toyoda, H., Miyake, M., Ishihara, E., Usami, M. and Tanigawa, K. 1996. Hypoglycemic

action of stigma of *Zea mays* L. in normal and diabetic mice. *Natural Medicines; 5 (5): 363-365.*

Mogale, M.A., Lebelo, S.L., Thovhogi, N., de Freitas, A. N. and Shai, L.J. 2011. Alpha-amylase and alpha-glucosidase inhibitory effects of *Sclerocarya birrea* [(A. Rich.) Hochst.] subspecies caffra (Sond) Kokwaro (anacardiaceae) stem-bark extracts. *African Journal of Biotechnology; 10(66): pp 15033-15039.*

Mohamed, E.A.E., Mohamed, A.A.O., Mohamed, S.A.A. and Faten, M.M.D. 2015. Phytochemical screening and HPTLC studies of *Ceiba pentandra* (L.) Gaertn. variety *pentandra* cultivated in Egypt. *Journal of Pharmacognosy and Phytochemistry; 4(1): 10-17.*

Mohammad, U.H., Md. Arif, K., S.M. Rakib-Uz-Zamman, Mohammad, T.A., Md. Saidul, I, Chaman, A.K. and Md. Salimullah 2016. Treating diabetes mellitus: Pharmacophore based designing of potential drugs from *Gymnema sylvestre* against insulin receptor protein. *BioMed Research International.*

Mohammed, A., Kumar, D., and Rizvi, S.I. 2015. Antidiabetic potential of some less commonly used plants in traditional medicinal systems of India and Nigeria. *J. Intercult. Ethnopharmacol.; 4(1): 78–85.*

Mohammed, A., Koorbanally, N.A. and Islam, Md. S. 2016. Anti-diabetic effect of *Xylopia aethiopica* (Dunal) A. Rich. (Annonaceae) fruit acetone fraction in type 2 diabetes model of rats. *Journal of Ethnopharmacology; 180: 131-139.*

Mohammed, A., Tanko, Y., Okasha, M.A., Magaji, R.A. and Yaro, A.H. 2007. Effects of aqueous leaves extract of *Ocimum gratissimum* on blood glucose levels of streptozotocin-induced diabetic Wistar rats. *African Journal of Biotechnology; 6 (18): 2087-2090.*

Mohammed, A., Tanko, Y., Okasha, M.A., Magaji, R.A. and Yaro, A.H. 2007. Effects of aqueous leaves extract of *Ocimum gratissimum* on blood glucose levels of streptozocin-induced diabetic

wistar rats. *African Journal of Biotechnology; 6 (18): 2087-2090* .

Mohammed, R.K., Ibrahim, S., Atawodi, S.E., Eze, E.D. and Suleiman, J.B. 2013. Anti-diabetic and haematological effects of n-butanol fraction of *Alchornea cordifolia* leaf extract in streptozotocin-induced diabetic Wistar rats. *Scientific Journal of Biological Sciences; 2(3): 45-53.*

Mohammed, R.K., Ibrahim, S., Atawodi, S.E., Eze, E.D., Suleiman, J.B., Ugwu, M.N. and Malgwi, I.S. 2013. Anti-diabetic and haematological effects of n-butanol fraction of *Alchornea cordifolia* leaf extract in streptozotocin-induced diabetic wistar rats. *Scientific Journal of Biological Sciences; 2 (3).*

Momoh, J., Aina, O.O., Akoro, S.M., Ajibaye, O and Okoh, H.I. 2014. In Vivo Anti-Plasmodial Activity and the Effect of Ethanolic Leaf Extract of Rauvolfia Vomitoria on hematological and Lipid Parameters in Swiss Mice Infected with Plasmodium Berghei NK 65. *Journal Home; 35: 1-2.*

Morabandza, C.J., Okemy, A.N., Ongoka, R.P., Okiemy-Akieli, M.G., Attibayeba A. and Abena A.A. 2014. Effets antimicrobiens, anti-inflammatoires et antioxydants du mésocarpe de *Garcinia kola* Heckel (Clusiaceae). *Phytothérapie ; 12 (3) : 164-169.*

Motala, A. and Ramaiya, K. 2010. Diabetes: the hidden pandemic and its impact on sub-saharan africa. *Diabetes Leadership Forum, Africa, Johannesburg, 30 Sep tember and 1 October, 2010.*

Muhammad, A.O., Adekomi, D.A. and Tijani, A.A. 2012. Effects of aqueous crude leaf extract of *Senecio biafrae* on the histology of the frontal cortex, kidney, liver and testis of male sprague dawley rats. *Scientific Journal of Biological Sciences; 1(1): 13-18.*

Muhammad, H.I., Asmawi, M.Z. and Khan, N.A.K. 2016. A review on promising phytochemical, nutritional and glycemic control studies on *Moring oleifera* Lam. in tropical and sub-tropical

regions. *Asian Pacific Journal of Tropical Biomedicine; 6(10): 896-902.*

Muhammad, H.L., Kabiru, A.Y., Busari, M.B., Mann, A., Abdullah, A.S., Usman, A.T. and Adamu, U. 2016. Acute oral toxicity study of ethanol extract of *Ceiba pentandra* leaves as a glucose lowering agent in diabetic rats. *Journal of Acute Disease; 5(3): 237-243.*

Muhammad, H.L., Kabiru, A.Y., Saidu, A.N, Buari, M.B., Babatunde, O.D. and Abdullah, A.S. 2015. Ameliorative properties of ethyl acetate fraction of *Ceiba pentandra* on serum glucose, hematological and biochemical parameters of diabetic rats. *Asian Pacific Journal of Tropical Disease; 5(9): 737-742.*

Muhammad, S., Hassan, L.G., Dangoggo, S.M., Hassan, S.W., Umar, K.J. and Aliyu, R.U. 2011. Acute and subchronic toxicity studies of Kernel extract of *Sclerocarya birrea* in rats. *Science World Journal; 6(3).*

Muhammad, S., Hassan, L. G., Dangoggo, S.M., Hassan, S.W., Umar, R.A. and Umar, K. J. 2014. Acute and Subchronic Toxicity Studies of *Sclerocarya birrea* Peels Extract in Rats. International Journal of Sciences: Basic and Applied Research (IJSBAR); 13 (1): 111-118.

Muttaka, A., Lawan, J. A. and Muhammed, S. S. 2016. Toxicological Studies of the Aqueous Leaves Extracts of *Combretum micranthum* on Rats. International Journal of Biotechnology and Biochemistry; 12 (2): 167-171.

Murti, K., Panchal, M.A. and Lambole, V. 2010. Pharmacological properties of *Boerhaavia diffusa* - A Review. *International Journal of Pharmaceutical Sciences Review and Research; 5 (2): 107 -110.*

N'doua, L.A.R., Abo, K.J.C., Aoussi, S., Gbogbo, M., Yapo, A.P., Ehile, E.E. 2015. Effets hypoglycemique et anti hyperglycemique de l'extrait ethanolique 70% de racines de *Rauvolfia vomitoria* Afzel (Apocynaceae). *European Scientific Journal; 11(6): 176-190.*

N'Guessan, B.Y.F., Rokia, S., Kiyinlma, C. and Diénéba, K.B. 2015. Minerals salt composition and secondary metabolites of *Euphorbia hirta* Linn., an antihyperglycemic plant. *Pharmacognosy Research; 7(1): 7-13.*

N'guessan, K., Fofie, Y.B.N., Coulibaly, K. and Kone, D. 2012. Evaluation de la toxicité aiguë de *Boerhavia diffusa* chez la souris. *Journal Home; 24 (1).*

N'guessan, K., Kouassi Konan, E. and Kouadio, K. 2009. Ethnobotanical study of plants used to treat diabetes, in traditional medicine, by Abbey and Krobou people of Agboville (Côte-d'Ivoire). *American Journal of Scientific Research; 4: 45-58.*

Nabukenya, I., Rubaire-Akiiki, C., Mugizi, D., Kateregga, J., Olila, D. and Höglund, J. (2014) Sub-acute Toxicity of Aqueous Extracts of *Tephrosia vogelii*, *Vernonia amygdalina* and Senna occidentalis in Rats. *Nat Prod Chem Res 2:143.*

Naidu, G.K., Naidu, K.C.S. and Sujatha, B. 2013. In vitro antibacterial activity and phytochemical analysis of leaves of *Gymnema sylvestre* Retz. R. Br. *International Journal of PharmTech Research; 5 (3): 1315-1320.*

Nakagawa, S., Masamoto, K., Sumiyoshi, H. and Harada, H. 1984. Acute toxicity test of garlic extract. *J Toxicol Sci.; 9 (1): 57-60.*

Nakavuma, J. L., Matasyoh, J. C., Nyokabi Wagara, I., Kalema, J. and Alinaitwe, L. 2016. Toxicity Studies on Anti-Fungal Essential Oils Extracted from Selected Aromatic Plants from Mabira and Kakamega Forests, East Africa. *European Journal of Medicinal Plants; 14 (2): 1-14.*

Nalmolu, R.K., Boini, K.M. and Namni, S. 2004. Effect of chronic administration of *Boerhaavia diffusa* Linn. leaf extract on experimental diabetes in rats. *Tropical Journal of Pharmaceutical Research; 3(1): 305-309.*

Naseri, M.K., Arabian, M., Badavi, M. and Ahangarpour, A. 2008. Vasorelaxant and hypotensive

effects of *Allium cepa* peel hydroalcoholic extract in rat. *Pak. J. Biol. Sci.; 11(12):1569-75.*

Natarajan, A., Ahmed, K.S.Z., Sundaresan, S., Sivaraj, A., Devi, K. and Kumar, B.S. 2012. Effect of aqueous flower extracts of *Catharanthus roseus* on alloxan induced diabetes in male albino rats. *International Journal of Pharmaceutical Sciences and Drug Research; 4(2): 150-153.*

Nath, P. and Yadav, A.K. 2014. Acute and sub-acute oral toxicity assessment of the methanol extract from leaves of *Hibiscus rosa-sinensis* L. in mice. *Journal of International Ethnopharmacology; 4(1): 70-73.*

Navghare, V.V. and Dhawale, S.C. 2017. *In vitro* antioxidant, hypoglycemic and oral glucose tolerance test of banana peels. *Alexandia Journal of Medicine; 53: 237-243.*

Ndam, L.M., Mih, A.M., Fongod, A.G.N., Tening, A.S., Tonjock, R.K., Enang, J.E. and Fujii, Y. 2014. Phytochemical screening of the bioactive compounds in twenty (20) Cameroonian medicinal plants. *International Journal of Current Microbiology and Applied Sciences; 3(12): pp. 768-778.*

Negi, J.S., Singh, P., Joshi, G.P., Rawat, M.S. and Bisht, V.K. 2010. Chemical constituents of *Asparagus*. *Pharmacognosy Review; 4(8): 215-220.*

Nessa, F., Ismail, Z. and Mohamed, N. 2012. Antimicrobial Activities of Extracts and Flavonoid Glycosides of Corn Silk (*Zea mays* L.). *International Journal of Biotechnology for Wellness Industries; 1 (2).*

Ngoc, T., Ngo, N., Van, T. and Phung V. 2008. Hypolipidemic effect of extracts from *Abelmoschus esculentus* L. (Malvaceae) on Tyloxapol-induced hyperlipidemia in mice. Warasan Phesatchasat, 35, 42–46, 2008.

Ngondi, J.L., Djiotsa, E.J., Fossouo, Z. and Oben, J. 2006. hypoglycaemic effect of the methanol extract of *Irvingia gabonensis* seeds on streptpzotocin diabetic rats. *Afr. J. Trad. CAM; 3(4): 74-*

77.

Ngondi, J.L., Etoundi, B.C., Nyangono, C.B., Mbofung, C.M.F. and Oben, J.E. 2009. OGOB131, a novel seed extract of the West African plant *Irvingia gabonensis*, significantly reduces body weight and improves metabolic parameters in overweight humans in a randomised double-blind placebo controlled investigation. *Lipids in Health and Disease; 8:7.*

Ngueguim, T.F., Massa, Z.B., Kouamouo, J., Tchuidjang, A., Dzeufiet, D.P.D., Kamtchouing, P. and Dimo, T. 2014. Antidiabetic and antioxidant effects of *Annona muricata* (Annonaceae), aqueous extract on streptozotocin-induced diabetic rats. *Journal of Ethnopharmacology; 15: 784-790.*

Nguelefack, T.B, Nana, P., Atsamo, A.D., Dimo, T., Watcho, P., Dongmo, A.B., Tapondjou, L.A., Njamen, D., Wansi, S.L. and Kamanyi, A. 2006. Analgesic and anticonvulsant effects of extracts from the leaves of *Kalanchoe crenata* (Andrews) Haworth (Crassulaceae). *J Ethnopharmacol.; 106 (1): 70-5*.

Nguelefack, T.B., Sontia, B., Dongmo, A.B., Dimo, T., Kamany, A. and Vierling, W. 2006. Spasmolytic effects of extracts from *Kalanchoe Crenata* Andrews (Crassulaceae) leaves. *Pharmacologyonline; 1: 30-39.*

Nishimura, H., Higuchi, O., Tateshita, K., Tomobe, K., Okuma, Y. and Nomura, Y. 2006. Antioxidative activity and ameliorative effects of memory impairment of sulfur-containing compounds in Allium species. *Biofactors.; 26: 135–146.*

Niyonzima, G., Laekeman, G., Witvrouw, M., Van Poel, B., Pieters, L., Paper D., De Clercq E., Franz G. and Vlietinck A.J. 1999. Hypoglycemic, anticomplement and anti-HIV activities of *Spathodea campanulata* stem bark. *Phytomedicine.; 6 (1): 45-9.*

Njike, G.N., Watcho, P., Nguelefack, T.B. and Kamanyi, A. 2005. Hypoglycaemic activity of the

leaves extracts of *Bersama engleriana* in rats. *Afr. J. Trad. CAM; 2(3): 215-221.*

Nkono Ya Nkono, B.L., Dongmo Sokeng, S., Dzeufiet Djomeni, P. D., Longo, F., Kamtchouing, P. 2014. Antihyperglycemic and antioxidant properties of *Alstonia boonei* De Wild. (Apocynaceae) stem bark aqueous extract in dexamethasone-induced hyperglycemic rats. *International Journal of Diabetes Research; 3 (3): 27-35.*

Nkono Ya Nkono, B.L., Dongmo Sokeng, S., Dzeufiet Djomeni, P. D., Longo, F., Kamtchouing, P. 2015. Subchronic toxicity of aqueous extract of *Alstonia boonei* de wild. (apocynaceae) stem bark in normal rats. *International Journal of Pharmacology and Toxicology; 3 (1): 5-10.*

Notka, F., Meier, G. and Wagner, R. 2004. Concerted inhibitory activities of *Phyllanthus amarus* on HIV replication in vitro and ex vivo. *Antiviral Res.; 64 (2): 93-102.*

Ntyonga-Pono, M.-P., 2015. L'observance du traitement antidiabetique chez les patients diabetiques au Gabon : donnés préliminaires. *Médecine des Maladies Métaboliques ; 9 (2) : 198-202.*

Nwamarah, J.U., Otitoju, O. and Otitoju, G.T.O. 2015. Chemical composition and anti-diabetic properties of *Jatropha curcas* leaves extract on alloxan induced diabetic Wistar rats. *African Journal of Biotechnology; 14(12): 1056-1066.*

Nwangwa, E.K. 2012. Antifertility effects of ethanolic extract of *Xylopia aethiopica* on male reproductive organ of wistar rats. *American Journal of Medicine and Medical Sciences; 2 (1).*

Nweze, N.E., Anene, B.M., Asuzu, I.U. and Ezema, W.S. 2012. Subacute toxicity study of the methanolic seed extract of *Buchholzia coriacea* (Capparaceae) in rats. *Comparative Clinical Pathology; 21 (5): 967-974.*

Nwodo, N.J., Okide, G.B., Okonta, J.M. and Ebebe, I.M. 2003. Antidiabetic effect of *Rauwolfia vomitoria* ethanolic leaf extract in rabbits. *Journal of Tropical Medicinal Plants; 4 (1): 71–74.*

Nwokocha, C.R., Ozolua, R.I, Owu, D.U., Nwokocha, M.I and Ugwu, A.C. 2011. Antihypertensive properties of *Allium sativum* (garlic) on normotensive and two kidneys one clip hypertensive rats. Niger. *J. Physiol. Sci.; 26: 213 –2181*.

Nyunaï, N., Abdennebi, E.H., Bickii, J. and Manguelle-Dicoum, M.A. 2015. Subacute antidiabetic properties of *Ageratum conyzoides* leaves in diabetic rats. *International Journal of Pharmaceutical Sciences and Research; 6 (4).*

Nyunaï, N., Gbaweng Yaya, A.J., Nkoulou Tabi, T.G., Deutou Tchamgoue, A., Ngondé, M.C. and Minka Minka, C.S. 2016. Anti-hyperglycemic and antioxidant potential of water-ethanol extract of *Musanga cecropioides* stem bark. *International Journal of Pharmaceutical Sciences and Drug Research; 8(1): 43-49.*

Nyunaï, N., Nijkam, N., Abdennebi, E.H., Mbafor, J.T and Lamnaouer, D. 2009. Hypoglycaemic and antihyperglycaemic activity of *Ageratum conyzoides* L. in rats. *African Journal of Traditional, Complementary and Alternative Medicines; 6 (2): 123-130.*

Obembe, O.O., Onasanwo, S.A. and Raji, Y. 2012. Preliminary study on the effects of *Buchholzia coriacea* seed extract on male reproductive parameters in rats. *Niger J. Physiol. Sci.; 27 (2): 165-9.*

Obianime, A.W. and Fi, U. 2010. The phytoconstituents and the comparative effects of aqueous extract of *Irvingia gabonensis* seeds and proviron on the biochemical parameters of male guinea pigs. *Asian Pacific Journal of Tropical Medicine; 101-104.*

Obianime, A.W., Aprioku, J.S. and Esomonu, C.T.O 2010. Antifertility effects of aqueous crude extract of *Ocimum gratissimum* L. leaves in male mice. *Journal of Medicinal Plant Research; 4: 9809-16.*

Obiudu, I.K, Okolie, A.C., Agbafor, K.N., Unaegbu, M.E., Engwa, G.A. and Obiudu, C.V. 2015.

Anti-diabetic property and phytochemical composition of aqueous and methanol extracts of *Buchholzia coriacea* seeds in alloxan-induced diabetic rats. *J. Med. Sci.; 15(5): 241-245.*

Obouayeba, A.P., Djyh, N.B., Diabate, S., Djaman, A.J., N'Guessan, J.D., Kone, M. and Kouakou, T.H. 2014. Phytochemical and antioxidant activity of roselle (*Hibiscus sabdariffa* L.) petal extracts. *Research Journal of Pharmaceutical, Biological and Chemical Sciences; 5(2): 1453-1465.*

Ocho-Anin Atchibri, A.L., Brou, K.D., Kouakou, T.H., Kouadio, Y.J. and Gnakri, D. 2010. Screening for antidiabetic activity and phytochemical constituents of common bean (*Phaseolus vulgaris* L.) seeds. *Journal of Medicinal Plants Research; 4(17): 1757-1761.*

Oduola, T., Bello, I., Adeosun, G., Ademosun, A.W., Raheem, G. and Avwioro, G. 2010. Hepatotoxicity and nephrotoxicity evaluation in Wistar albino rats exposed to *Morinda lucida* leaf extract. *N Am J Med Sci.; 2 (5): 230-3.*

Oduola, T., Bello, I., Idowu, T., Avwioro, G., Adeosun, G. and Olatubosun, L.H. 2010. Histopathological changes in Wistar albino rats exposed to aqueous extract of unripe *Carica papaya*. *N. Am. J. Med. Sci.; 2: 234–237.*

Oduori, O., Sugawara, K., Yoshida, S., Takahashi, H., Yokoi, N., Nakayama, M. and Seino, S. 2016. Trans-S-1-propenyl-l-cysteine sulfoxide from *Allium cepa* (onions) has appreciable antidiabetic potential in streptozotocin-induced diabetic mice. *Oral presentation/ Diabetes Research and Clinical Practice; 120S1: S40-S64.*

Ofusori, D.A., Komolafe, O.A., Adewole, O.S., Arayombo, B.E, Margolis, D. and Naicker, T. 2016. Morphological study of the effects of aqueous leaf extract of *Xylopia aethiopica* on the pancreas in diabetic rats. *Italian Journal of Anatomy and Embryology; 121(1): 77-87.*

Ogawa, Y., Sekita, K., Umemura, T., Saito, M., Ono, A., Kawasaki, Y., Uchida, O., Matsushima,

Y., Inoue, T. and Kanno, J. 2004. *Gymnema sylvestre* leaf extract: a 52-week dietary toxicity study in Wistar rats. *Shokuhin Eiseigaku Zasshi.; 45 (1): 8-18.*

Ogbonnia, S., Adekunle, A.A., Bosa, M.K. and Enwuru, V.N. 2008. Evaluation of acute and subacute toxicity of *Alstonia congensis* Engler (Apocynaceae) bark and *Xylopia aethiopica* (Dunal) A. Rich (Annonaceae) fruits mixtures used in the treatment of diabetes. *African Journal of Biotechnology; 7 (6): 701-705.*

Ogbonnia, S., Adekunle, A.A., Bosa, M.K. and Enwuru, V.N. 2008. Evaluation of acute and subacute toxicity of *Alstonia congensis* Engler (Apocynaceae) bark and *Xylopia aethiopica* (Dunal) A. Rich (Annonaceae) fruits mixtures used in the treatment of diabetes. *African Journal of Biotechnology; 7(6): pp 701-705.*

Oguanobi, N.I., Chijioke, C.P. and Ghasi, S. 2012. Anti-diabetic effect of crude leaf extracts of *Ocimum gratissimum* in neonatal streptozotocin-induced type-2 model diabetic rats. *International Journal of Pharmacy and Pharmaceutical Sciences; 4(5): 77-83.*

Ogunrinola, O.O., Fajana, O.O, Olaitan, S.N., Adu, O.B. and Akinola, M.O. 2015. Anti-diabetic activity of *Ipomoea batatas* leaves extract: effects on hepatic enzymes in alloxan-induced diabetic rats. *Research Journal of Medicinal Plant; 9: 227-233.*

Ojewole, J.A.O. 2003. Hypoglycemic effect of *Sclerocarya birrea* {(A. Rich) Hochst.} [Anacardiaceae] stem-bark aqueous extract in rats. *Phytomedicine; 10: 675-681.*

Ojewole, J.A.O. 2005. Analgesic and anticonvulsant properties of *Tetrapleura tetraptera* (Taub) (Fabaceae) fruit aqueous extract in mice. *Phytotherapy Research; 19 (12): 1023–1029, 2005.*

Ojewole, J.A.O. and Adewunmi, C.O. 2004. Anti-inflammatory and hypoglycaemic effects of *Tetrapleura tetraptera* (Taub) [fabaceae] fruit aqueous extract in rats. *Journal of Ethnopharmacology; 95: 177-182.*

Ojewole, J.A.O., Mawoza, T., Chiwororo, W.D.H. and Owira, P.M.O. 2010. *Sclerocarya birrea* (A. Rich) Hochst. ['marula'] (Anacardiaceae): a review of its phytochemistry, pharmacology and toxicology and its ethnomedicinal uses. *Phytotherapy Research; 24 (5): 633–639, 2010.*

Ojewunmi, O., Oshodi, T., Ogundele, O., Chijioke, M. and Adenekan, S. 2013. Toxicity screening and *in vitro* antioxidant activities of aqueous extracts of *Morinda lucida* sp and *Saccharum officinarum* sp leaves. *Biokemistri; 25 (2): 72-78.*

Ojewunmi, O., Oshodi, T., Ogundele, O., Chijioke, M. and Adenekan, S. 2013. Evaluation of the anti-diabetic and antioxidant activities of aqueous extracts of *Morinda lucida* and *Saccharum officinarum* leaves in alloxan-induced diabetic rats. *International Journal of Biochemistry Research & Review; 3 (3): 266-277.*

Ojiako, O.A. and Nwanjo, H.U. 2006. Is *Vernonia amygdalina* hepatotoxic or hepatoprotective? Response from biochemical and toxicity studies in rats. *African Journal of Biotechnology; 5(18): pp 1648-1651.*

Ojo, O.A., Ajiboye, B.O., Oyinloye, B.E. and Ojo, A.B. 2014. Prophylactic effects of ethanol extract of *Irvingia gabonensis* stem bark against cadmium-induced toxicity in albino rats. *Advances in Pharmaceutics.*

Ojo, O.A, Oloyede, O., Olarewaju, O., Ojo, A.B., Ajiboye, B.O and Onikanni, S.A. 2013. Toxicity Studies of the Crude Aqueous Leaves Extracts of *Ocimum gratissimum* in Albino Rats. *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT); 6 (4): 34-39.*

Okeke, I.N., Ogundaini, A.O., Ogungbamila, F.O. and Lamikanra, A. 1999. Antimicrobial spectrum of *Alchornea cordifolia* leaf extract. *Phytother Res.;13 (1): 67-9.*

Okokon, J.E., Aniekan, E.U. and Bassey, S.A. 2007. Antimalaria activity of ethanolic extract of

Tetrapleura tetraptera fruit. *Journal of Ethnopharmacology, 111 (3): 537.*

Okokon, J.E., Antia, B.S., Osuji, L.C. and Udia, P.M. 2007. Antidiabetic and hypolipidemic effects of *Mammea Africana* (Guttiferae) in streptozotocin induced diabetic rats. *Journal of Pharmacology and Toxicology; 2(3): 278-283.*

Okokon, J.E., Bawo, M.B. and Mbagwu, H.O. 2016. Hepatoprotective activity of *Mammea Africana* ethanol stem bark extract. *Avicenna Journal of Phytomedicine; 6(2).*

Okonkwo, P.O. and Okoye, Z.S.C. 2009. Hypoglycemic effects of the aqueous extract of *Newbouldia laevis* root in rats. *Int. J. Biol. Chem. Sci.; 3(5): 998-1004.*

Okonkwo, T. J. N., Okorie, O., Okonta, J. M. and Okonkwo, C. J. 2010. Sub-chronic hepatotoxicity of *Anacardium occidentale* (Anacardiaceae) inner stem bark extract in rats. *Indian J Pharm Sci; 72 (3): 353-357.*

Okoli, C.O., Ezike, A.C., Agwagah, O.C., and Akah, P.A. 2010. Anticonvulsant and anxiolytic evaluation of leaf extracts of *Ocimum gratissimum*, a culinary herb. *Pharmacognosy Res.; 2 (1): 36–40.*

Okolie, N., Israel, E. and Falodun, A. 2011. In-vitro evaluation of antioxidant potential of *Rauwolfia vomitoria* root extract and its inhibitory effect on lipid peroxidation as indication of aphrodisiac properties. *Pharmaceutical Chemistry Journal; 45 (8): 476.*

Okolo, C.O., Johnson, P.B., Abdurahman, E.M., Abdu-Aguye, I. and Hussaini, I.M. 1995. Analgesic effect of Irvingia gabonensis stem bark extract. *J. Ethnopharmacol.; 45 (2): 125-9.*

Okoro, I.O., Umar, I.A., Atawodi, S.E. and Anigo, K.M. 2014. Antidiabetic effect of *Cleome rutidosperma* DC and *Senecio biasfree* (Oli. & Hiern) extracts in streptozotocin-induced diabetic rats. *International Journal of Pharmaceutical Sciences and Research; 53: pp. 2490-2507.*

Okpashi, V.E., Bayim, B.P.R and Obi-Abang, M. 2014. Comparative effects of some medicinal

plants: *Anacardium occidental, Eucalyptus globules, Psidium guava,* and *Xylopia aethiopica* extracts in alloxan-induced diabetic male Wistar albino rats. *Biochemistry Research International.*

Okwu, D. E. 2008. *Citrus* fruits: A rich source of phytochemicals and their roles in human health. *Int. J. Chem. Sci.; 6(2): 451-471.*

Okwuasaba, F.K., Osunkwoa, U.A., Ekwenchib, M.M., Ekpenyongb, K.I., Onwukemec, K.E., Olayinkad, A.O., Ugurue, M.O. and Dasf, S.C. 1991. Anticonceptive and estrogenic effects of a seed extract of *Ricinus communis* var. minor. *Journal of Ethnopharmacology; 34: 141- 145.*

Olajide, O.A., Awe, S.O., Makinde, J.M. and Morebise, O. 1999. Evaluation of the anti-diabetic property of *Morinda lucida* leaves in streptozotocin-diabetic rats. J Pharm Pharmacol.; 51 (11): 1321-4.

Olaleye, M.T., Adegboye, O.O. and Akindahunsi, A.A. 2006. *Alchornea cordifolia* extract protects wistar albino rats against acetaminophen induced liver damage. *African Journal of Biotechnology; 5: 2439-2445.*

Olaleye, M.T., Kolawole, A.O. and Ajele, J.O. 2007. Antioxidant properties and glutathione stransferases inhibitory activity of *Alchornea cordifolia* leaf extract in acetaminophen-induced liver injury. *Iranian Journal of Pharmacology & Therapeutics; 6: 63-66.*

Olaleye, S.B., Farombi, E.O., Adewoye, E.A., Owoyele, B.V., Onasanwo, S.A. and Elegbe, R.A. 2000. Analgesic and anti-inflammatory effects of kolaviron (a *Garcinia kola* seed extract). *Afr. J. Biomed. Res.; 3: 171 – 174.*

Olivier, D.K., Van Vuuren, S.F. and Moteetee, A.N. 2015. *Annickia affinis* and A. *chlorantia* (*Enantia chlorantha*) – A review of two closely related medicinal plants from tropical Africa. *Journal of Ethnopharmacology; 176: 438-462.*

Oloro, J., Kihdze, T.J., Katusiime, B., Imanirampa, L., Waako, P., Bajunirwe, F. and Ganafa, A.A. 2015. Toxicity of four herbs used in erectile dysfunction; *Mondia whiteii*, *Cola acuminata*, *Urtica massaica*, and *Tarenna graveolensin* male rats. *Afr. J. Pharm. Pharmacol.; 9 (30): 756-763.*

Oloyede, G. K., Onocha, P. A. and Olaniran, B. B. 2011. Phytochemical, toxicity, antimicrobial and antioxidant screening of leaf extracts of *Peperomia pellucida* from Nigeria. *Advances in Environmental Biology, 5(12): 3700-3709.*

Olowu, A.O., Adeneye, A.A., Adeyemi, O.O. 2011. Hypoglycaemic effect of *Ipomoea batatas* aqueous leaf and stem extract in normal and streptozotocin-induced hyperglycaemic rats. *J Nat Pharm; 2: 56-61.*

Olubomehin, O.O., Abo, K.A. and Ajaiyeoba, E.O. 2013. Alpha-amylase inhibitory activity of two *Anthocleista* species and in vitro rat model anti-diabetic activities of *Anthocleista djalonensis* extracts and fractions. *Journal of Ethnopharmacology; 146: 811-814.*

Omage, K., Idokpesi, O.G., Josiah, J.S., Uhunmwangho, S.E. and Ajeigbe, O.K. 2010. Evaluation of Hypoglycemic and Antioxidative Properties of Aqueous Extract of *Garcinia kola* Seeds in Wistar rats. *Research Journal of Biological Sciences; 5 (10): 647-649.*

Ombra, M.N., D'Acierno, A., Nazzaro, F., Riccardi, R., Spigno, P., Zaccardelli, M., Pane, C., Maione, M. and Fratianni, F. 2016. Phenolic composition and antioxidant and antiproliferative activities of the extracts of twelve common bean (*Phaseolus vulgaris* L.) endemic ecotypes of southern Italy before and after cooking. *Oxidative Medicine and Cellular Longevity.*

Omodamiro, O.D, Ohaeri, O.C. and Nweke, I.N. 2012. Oxytocic effect of aqueous, ethanol, n-hexane and chloroform extracts of *Xylopia aethiopica* (Anonaceae) and *Ocimum gratissium* (Labiate) on guinea pig uterus. *Asian Journal of Plant Science and Research; 2(1): 73-78.*

Omonkhua, A.A. and Onoagbe, I.O. 2012. Long-term effects of three hypoglycaemic plants (*Irvingia gabonensis, Urena lobata* and *Carica papaya*) on the oxidative status of normal rabbits. *An International Journal of the Nigerian Society for Experimental Biology; 24(2): 82-89.*

Omonkhua, A.A., Onoagbe, I.O., Fajimeye, I.A., Adekola, M.B. and Imoru, Z.A. 2014. Long-term anti-diabetic and anti-hyperlipidaemic effects of aqueous stem bark extract of *Irvingia gabonensis* in streptozotocin-induced diabetic rats. *Biokemistri; 26 (1): 1–8.*

Ong, K.W., Hsu, A., Song, L., Huang, D. and Tan, B.K.H. 2011. Polyphenols-rich *Vernonia amygdalina* shows anti-diabetic effects in streptozotocin-induced diabetic rats. *Journal of Ethnopharmacology; 133: 598-607.*

Onyekwe, N.G., Ilodigwe, E.E., Ajaghaku, D.L. and Esimone, C.O. 2011. Acute and subchronic toxicities of ethanol root extract of *Psidium guajava* (myrtaceae) in experimental animals. *Journal of Pharmaceutical and Biomedical Sciences; 12 (18).*

Opajobi, A.O., Esume, C.O., Campbell, P., Onyesom, I. and Osasuyi, A. 2011. Effects of aqueous extracts of Rauvolfia vomitoria and *Citrus aurantium* on liver enzymes of streptozotocin-induced diabetic and normal rabbits. *Continental J. Medical Research; 5(1): 1-5.*

Orisakwe, O.E., Husaini, D.C. and Afonne, O.J. 2004. Testicular effects of sub-chronic administration of *Hibiscus sabdariffa* calyx aqueous extract in rats. *Reprod. Toxicol.; 18 (2): 295-8.*

Orisakwe, O.E., Onyenmechi, J. A., Chude, M. A., Ejeatuluchukwu, O. and Chudi, E. D. 2003. Sub-chronic Toxicity Studies of the Aqueous Extract of *Boerhavia diffusa* Leaves. *Journal of Health Science; 49(6): 444–447*.

Orji, E. A., Mgbenka, B. O., Egba, S. I and Obike, C. A. 2016. Investigation of sub-acute toxicity and hypolipidaemic effect of aqueous and methanol fruit extract of *Xylopia aethiopica. J. Chem.*

Pharm. Res.; 8(1): 775-780

Osabede, P.O., Odoh, E.U. and Usor, P. 2014. Natural products as potential sources of antidiabetic drugs. *British Journal of Pharmaceutical Research; 4(17): 2075-2095.*

Osabede, P.O., Okide, G.B., and Akabogu, I.C. 2004. Study on anti-diabetic activities of crude methanol extracts of *Loranthus micranthus* (Linn.) sourced from five different host trees. *Journal of Ethnopharmacology*; *95 133-138.*

Osadebe, P.O., Uzor, P.F., Omeje, E.O., Agbo, M.O. and Obonga, W.O. 2014. Hypoglycemic activity of the extract and fractions of *Anthocleista vogelii* (Planch) Stem Bark. Tropical *Journal of Pharmaceutical Research; 13 (9): 1437-1443.*

Osigwe, C.C., Akah, P.A., Nworu, C.S., Okoye, T.C. and Tchimene, M.K. 2015. Antihyperglycemic studies on the leaf extract and active fractions of Newbouldia laevis (Bignoniaceae). *Pharmacology & Pharmacy; 6: 518-532.*

Ouédraogo, M., Da, F.L., Fabré, A., Konaté, K., Dibala, C.I., Carreyre, H., Thibaudeau, S., Coustard, J.M., Vandebrouck, C., Bescond, J., and Belemtougri, R.G. 2013. Evaluation of the Bronchorelaxant, Genotoxic, and Antigenotoxic Effects of *Cassia alata* L. *Evidence-Based Complementary and Alternative Medicine.*

Owolabi, M.A., Abass, M.M., Emeka, P.M., Jaja, S.I., Nnoli, M. and Dosa, B.O.S. 2010. Biochemical and histologic changes in rats after prolonged administration of the crude aqueous extract of the leaves of *Vitex grandifolia*. *Pharmacognosy Research; 2(5): 273-278.*

Oyewusi j, A., Saba, A. B. and Olukunle, J. O. 2015. Phytochemical, elemental and acute toxic effects of methanol extract of onion (*Allium cepa*) bulbs in Wistar albino rats experimentaly pre-exposed and rested for a week. *Vom Journal of Veterinary Science; 10: 65 – 74.*

Ozsoy-Sacan, O., Yanardag, R., Orak, H., Ozgey, Y., Yarat, A. and Tunali, T. 2006. Effects of

parsley (Petroselinum crispum) extract versus glibornuride on the liver of streptozptocin-induced diabetic rats. *Journal of Ethnopharmacology; 104: 175-181.*

Padilla-Camberos, E., Martínez-Velázquez, M., Flores-Fernández, J.M., and Villanueva-Rodríguez, S. 2013. Acute toxicity and genotoxic activity of avocado seed extract (Persea americana Mill., c.v. Hass). *The Scientific World Journal.*

Palaksha, M.N., Ravishankar, K. and Girija Sastry, V. 2015. Biological evaluation of *In-vivo* diuretic, and antiurolithiatic activities of ethanolic leaf extract of *Saccharum officinarum*. I.A.J.P. R.; 5 (6): 2232-2238.

Panda, V. and Sonkamble, M. 2012. Phytochemical constituents and pharmacological activities of *Ipomoea batatas* I. (Lam)- A review. *International Journal of Research in Phytochemistry & Pharmacology; 2(1): 25-34.*

Panda, V., Sonkamble, M., and Patil, S. 2011. Wound healing activity of *Ipomoea batatas* tubers (sweet potato). *Functional Foods in Health and Disease; 10: 403-415.*

Parle, M. and Dhamija, I. 2013. *Zea maize*: a modern craze: *Int. res. j. Pharm.; 4 (6).*

Parveen, S., Das, S., Prakash Kundra, C., and Pereira, B.M.J. 2003. A comprehensive evaluation of the reproductive toxicity of *Quassia amara* in male rats. *Reproductive Toxicology; 17: 45-50.*

Patel, D.K., Prasad, S.K., Kumar, R. and Hemalatha, S. 2012. An overview on antidiabetic medicinal plants having insulin mimetic property. *Asian Pac. J. Trop. Biomed.; 2(4): 320-330.*

Patel, J.R., Tripathi, P., Sharma, V., Chauhan, N.S. and Dixit, V.K. 2011. *Phyllanthus amarus: ethnomedicinal uses, phytochemistry and pharmacology: a review. J Ethnopharmacol.;138 (2): 286-313.*

Patil, S.B., Naikwade, N.S. and Magdum, C.S. 2009. Review on phytochemistry and pharmacological aspects of *Euphorbia hirta* linn. *J.P.R.H.C.; 1 (1): 113-133.*

Paula, P.C., Oliveira, J.T.A., Sousa, D.O.B., Alves, B.G.T., Carvalho, A.F.U., Franco, O.L. and Vasconcelos, I.M. 2016. Insulin-like plant proteins as potential innovative drugs to treat diabetes - The *Moringa oleifera* case study. *New Biotechnology; article in press.*

Pawar, S.P., Sathwane, P.N., Metkar, B.R., Pal, S.C, Kasture, V.S., and Kasture, S.B. 2000. Anti – Inflammatory and analgesic activity of *Anacardium Occidentale* leaf extracts. *Anc Sci Life; 19 (3-4): 169–173.*

Pekamwar, S. S., Kalyankar, T.M. and Jadhav, A.C. 2013. *Hibiscus rosa-sinensis*: A review on ornamental plant. *World Journal of Pharmacy and Pharmaceutical Sciences; 2 (6): 4719-4727.*

Pérez, Y.Y., Jiménez-Ferrer, E., Zamilpa, A., Hernández-Valencia, M., Alarcón-Aguilar, F.J., Tortoriello, J., Román-Ramos, R., 2007. Effect of a polyphenol-rich extract from Aloe vera gel on experimentally induced insulin resistance in mice. American Journal of Chinese Medicine 35, 1037–1046

Pérez, G.S., Zavala, S.M., Arias, G.L. and Ramos, L.M. 2011. Anti-inflammatory activity of some essential oils. *Journal of Essential Oil Research; 23.*

Ping, K.Y., Ibrahim, D., Yeng, C., Subramaniam, S. and Sreenivasan, S. 2013. Acute and Subchronic Toxicity Study of *Euphorbia hirta* L. Methanol Extract in Rats. *BioMed Research International*. Pingale Shirish, S. 2011. Acute toxicity study for *Ricinus communis*. *Der Pharmacia Lettre; 3 (5): 132-137.*

Pochapski, M.T., Fosquiera, E.C., Esmerino, L.A., Dos Santos, E.B., Farago, P.V., Santos, F.A. and Groppo F.C. 2011. Phytochemical screening, antioxidant and antimicrobial activities of the crude leaves extract from *Ipomoea batatas* (L.) Lam. *Pharmacogn Mag.; 7 (26): 165-70.*

Pour, B.M., Latha, L.Y. and Sasidharan, S. 2011. Cytotoxicity and oral acute toxicity studies of *Lantana camara* leaf extract. *Molecules; 16: 3663-3674.*

Rajesh, K., Harsha, R., Mohammed, G.A., Hareesh, A.R., Thammanna, G.S.S., Dinesha, R., Satish Kumar, B.P., Irfan, A.M. 2010. Antimicrobial activity of ethanol extract of leaf and flower of *Spathodea campanulata* P. Beauv. *R.J.P.B.C.S.; 1 (3): 691-698.*

Raji, Y., Akinsomisoye, O.S. and Salman, T.M. 2005. Antispermatogenic activity of *Morinda lucida* extract in male rats. *Asian Journal of Androl.; 2: 405-410.*

Rana, M., Dhamija, H., Prashar, B., Sharma, S. 2012. *Ricinus communis* L. – A Review. *Int. J. Pharmtech. Res.; 4 (4): 1706-1711.*

Ravi, K. and Divyashree, P. 2014. *Psidium guajava*: A review on its potential as an adjunct in treating periodontal disease. *Pharmacogn Rev.; 8 (16): 96–100.*

Rhamani, A.H., Aldebasi, Y.H., Srikar, S., Khan, A.A. and Aly, S.M. 2015. *Aloe vera*: Potential candidate in health management via modulation of biological activities. *Pharmacognosy Review; 9(18): 120-126.*

Renjith, R.S., Chikku, A.M. and Rajamohan, T. 2013. Cytoprotective, antihyperglycemic and phytochemical properties of *Cocos nucifera* (L.) inflorescence. *Asian Pacific Journal of Tropical Medicine 804-810.*

Rong, X., Gang, P., Takuya, S., Qinglin, Y., Johji, Y. and Yuhao, L. 2009. A 35-day gavage safety assessment of ginger in rats. *Regul Toxicol Pharmacol; 54 (2): 118-123.*

Rosemary, Rosidah and Ginda, H. 2014. Antidiabetic effect of roselle calyces extract (*Hibiscus sabdariffa* L.) in streptozotocin induced mice. *International Journal of PharmTech Research; 6(5): 1703-1711.*

Sabitha, V., Ramachandran, S., […], and Panneerselvam, K. 2011. Antidiabetic and antihyperlipidemic potential of *Abelmoschus esculentus* (L.) Moench. in streptozotocin-induced diabetic rats. *J. Pharm. Bioallied Sci.; 3(3): 397-402.*

Sachdewa, A. and Khemani, L.D. 2003. Effect of *Hibiscus rosa sinensis* Linn. ethanol flower extract on blood glucose and lipid profile in streptozotocin induced diabetes in rats. *Journal of Ethnopharmacology; 89: 61-66.*

Sahu, P.K., Giri, D.D., Singh, R., Pandey, P., Gupta, S., Shrivastava, A.K., Kumar, A. and Pandey, K. D. 2013. Therapeutic and Medicinal Uses of Aloe vera: A Review. *Pharmacology & Pharmacy; 4: 599-610.*

Santas, J., Pilar, M. and Carbo, A.R. 2010. Antimicrobial and antioxidant activity of crude onion (*Allium cepa*, L.) Extracts. *International Journal of Food Science and Technology; 45: 403–409.*

Satyaprakash, R.J., Rajesh, M.S., Bhanumathy, M., Harish, M.S., Shivananda, T.N., Shivaprasad, H.N. and Sushma, G. 2013. Hypoglycemic and antihyperglycemic effect of *Ceiba pentandra* L. Gaertn in normal and streptozotocin-induced diabetic rats. *Ghana Medical Journal; 47(3).*

Saxena, M., Saxena, J. and Khare, S. 2012. A brief review on: Therapeutical values of *Lantana camera* plant. *International Journal of Pharmacy & Life Sciences; 3(3): 1551-1554.*

Seung, T.W., Park, S.K., Kang, J.Y., Kim, J.M., Park, S.H., Kwon, B.S., Lee, C.J., Kang, J.E., Kim, D.O., Lee, U. and Heo, H.J. 2018. Ethyl acetate fraction from *Hibiscus sabdariffa* L. attenuates diabetes-associated cognitive impairement in mice. *Food Research International; 105: 589-598.*

Shah, G., Shri, R., Panchal, V., Sharma, N., Singh, B., and Mann, A.S. 2011. Scientific basis for the therapeutic use of *Cymbopogon citratus*, stapf (Lemon grass). *J. Adv Pharm Technol Res.; 2 (1): 3–8.*

Sharma O.P., Makkar H.P., Dawra R.K., Negi S.S. 1981.; A review of the toxicity of *Lantana camara* (Linn) in animals. *Clin Toxicol., 18(9):1077-94*, 1981.

Sharma, M., Fernandes, J., Ahirwar, D. and Jain, R. 2008. Hypoglycemic and hypolipidimic activity of alcoholic extract of *Citrus aurantium* in normal and alloxan-induced diabetic rats.

Pharmacologyonline; 3: 161-171.

Sharma, S., Choudhary, M., Bhardwaj, S., Choudhary, N. and Rana, A.C. 2014. Hypoglycemic potential of alcoholic root extract of *Cassia occidentalis* Linn. in streptozotocin induced diabetes in albino mice. *Bulletin of Faculty of Pharmacy, Cairo University; 52: 211-217.*

Sharma, S., Dhamija, H.K. and Parashar, B. 2012. *Jatropha curcas*: A review. *Asian J. Res. Pharm. Sci.; 2 (3): 107-111*.

Sharma, S., Tandon, S., Semwal, B., Singh, K. 2011. *Momordica charantia* Linn.: A Comprehensive Review on Bitter Remedy. *Journal of Pharmaceutical Research and Opinion; 1 (2): 42 – 47.*

Shetti, A. and Kaliwal, B.B. 2015. Hypoglycemic activity of ethanol leaf extract of *Phyllantus amarus* in alloxan induced diabetic mice. *European Journal of Experimental Biology; 5(1): 26-29.*

Shetti, A.A., Sanakal, R.D. and Kaliwal, B.B. 2012. Antidiabetic effect of ethanol leaf extract of *Phyllantus amarus* in alloxan induced diabetic mice. *Asian Journal of Plant Science and Research; 2(1): 11-15.*

Shittu, H., Gray, A., Furman, B. and Young, L. 2010. Glucose uptake stimulatory effect of akuammicine from *Picralima nitida* (Apocynaceae). *Phytochemistry Letters; 3: 53-55.*

Shokeen, P., Anand, P., Murali, Y.K. and Tandon, V. 2008. Antidiabetic activity of 50% ethanol extract of *Ricinus communis* and its purified fractions. *Food and Chemical Toxicology; 46: 3458-3466.*

Silva, M.G.B., Aragão, P. T., Vasconcelos, C. F. B., Ferreira, P. A., Andrade, B. A., Costa, I. M. A., Costa-Silva, J. H., Wanderleya, A. G. and Lafayette, S. S. L. 2011. Acute and subacute toxicity of *Cassia occidentalis* L. stem and leaf in Wistar rats. *Journal of Ethnopharmacology; 136 (2):*

341-346.

Sima Obiang C., Obame Engonga LC., Ondo JP., Zongo C., Nsi Emvo E., Traoret A. 2015. Ethnotherapy study, phytochemical screening and antioxidant activity of *Antrocaryon klaineanum* Pierre and *Anthocleista nobilis* G. Don. Medicinal plants from Gabon. *International Journal of Advanced Research (3), issue 5, 812-819.*

Singh, A., Lal, U.R., Mukhtar, H.M., Singh, P.S., Shah, G. and Dhawan, R.K. 2015. Phytochemical profile of sugarcane and its potential health aspects. *Pharmacognosy Review; 9(17): 45-54.*

Singh, S.B., Devi, W.R., Marina, A., Devi, W.I., Swapana, N. and Singh, C.B. 2013. Ethnobotany, phytochemistry and pharmacology of *Ageratum conyzoides* Linn (Asteraceae). *Journal of Medicinal Plants Research; 7(8):371-385*.

Singh, S.K., Kesari, A.N., Rai, P.K. and Watal, G. 2007. Assessment of glycemic potential of *Musa paradisiaca* stem juice. *Indian Journal of Clinical Biochemistry; 22(2): 48-52*.

Sio, S., Sia, I.C. and Cortes-Maramba, N.P. 2001. Acute oral toxicity of the freeze-dried aqueous extract of *Peperomia pellucida* (L) HBK (ulasimang bato) in mice. *Acta Medica Philippina; 37(1-2): 1-11*.

Sireeratawong, S., Itharat, A., Khonsung, P., Lertprasertsuke, N. and Jaijoy, K. 2013. Toxicity studies of the water extract from the calyces of *Hibiscus sabdariffa* L. in rats. *Afr. J. Tradit. Complement. Altern. Med.; 10(4): 122-127.*

Socorro, V.F., Madeira, Matos F.J.A., Leal-Cardoso, J.H. and Criddle, D.N. 2002. Relaxant effects of the essential oil of *Ocimum gratissimum* on isolated ileum of the guinea pig. *Journal of Ethno pharmacology; 81: 1-4.*

Sokeng, S.D., Rokeya, B., Hannan, J.M.A., Ali, L., Kamtchouing, P. 2013. The antihyperglycemic effect of *Bridelia ndellensis* ethanol extract and its fractions is mediated by an insulinotropic

action. *Journal of Diabetes Mellitus; 3 (3): 111-115*.

Sokeng, S.D., Rokeya, B., Mostafa, M., Nahar, N., Mosihuzzaman, M., Ali, L. and Kamtchouing, P. 2005. Antihyperglycemic effect of *Bridelia ndellensis* ethanol extract and fractions in streptozotocin-induced diabetic rats. *Afr. J. Trad. CAM; 2(2): 94-102.*

Somova, L.I., Shode, F.O., Moodley, K. and Govender, Y. 2001. Cardiovascular and diuretic activity of kaurene derivatives of *Xylopia aethiopica* and *Alepidea amatymbica*. *Journal of Ethnopharmacology; 77 (2–3): 165–174.*

Souza, A., Mbatchi, B. and Herchuelz, A. 2011. Induction of insulin secretion by an aqueous extract of *Tabernanthe iboga* Baill. (Apocynaceae) in rat pancreatic islets of Langerhans. *Journal of Ethnopharmacology; 133: 1015-1020.*

Sowemimo, A., Eboji, O., Fageyinbo, M. S., Olowokudejo, A., Ibrahim, M. 2015. *Musanga cecropioides* leaf extract exhibits anti-inflammatory and anti-nociceptive activities in animal models. *Revista Brasileira de Farmacognosia; 25: 506–512.*

Srividya, N. and Periwal, S. 1995. Diuretic, hypotensive and hypoglycaemic effect of Phyllanthus amarus. *Indian J Exp Biol.; 33 (11): 861-4*.

Sudhakar, N. and Vidhya, R.M.T. 2010. Potential medicinal properties of *Carica papaya* linn. - A mini review. *Int. J. Pharm. Sci.; 6 (2): 1-4*.

Sumit, N.L., Swarnkar, S. and Mruthunjay 2013. Biological and chemical sciences *Jatropha curcas*: a systemic review on pharmacological, phytochemical, toxicological profiles and commercial applications. *Research Journal of Pharmaceutical; 4 (1): 989-1010.*

Sunday, R.M., Ayannuga, O.A., Ibeh, J.A., Ajige, L.A., Oyedele, O.J., Ibeh, B.O., Obuotor, E.M. and Ilesanmi, O.R. 2017. Anti- diabetic effect of *Anthocleista vogelii* ethanolic root extract and fractions in Streptozotocin- induced diabetic albino rats. *European Journal of Medicinal Plants,*

20(3): 1-18.

Suryawanshi, J.A.S. 2011. An overview of *Citrus aurantium* used in the treatment of various diseases. *African Journal of Plant Science; 5(7): 390-395.*

Sutar, N.G., Sutar, U.N. and Behera, B.C. 2009. Antidiabetic activity of the leaves of *Mimosa pudica* Linn in albino rats. *Journal of Herbal Medicine and Toxicology; 3(1): 123-126.*

Swargiary, A., Boro, H., Brahma, B. K., and Rahman, S. 2013. Ethno-Botanical Study of Anti-Diabetic Medicinal Plants used by the Local People of Kokrajhar District of Bodoland Territorial Council, India. *Journal of Medicinal Plants Stud ies*, 1(5): 51-58.

Swathi, D., Jyothi, B. and Sravanthi, C. 2011. A Review: Pharmacognostic studies and Pharmacological actions of *Musa Paradisiaca. International Journal of Innovative Pharmaceutical Research.; 2 (2): 122-125.*

Taiwe, G.S., Bum, E.N., Dimo, T., Talla, E. and Weiss, N. 2010. Antidepressant, myorelaxant and anti-anxiety-like effects of *Nauclea latifolia* smith (Rubiaceae) roots extract in murine models. *Int. J. Pharmacol.; 6: 364-371*.

Taiwe, G.S., Bum, E.N., Talla, E., Dimo, T., Weiss, N., Sidiki, N., Dawe, A., Moto, F.C.O., Dzeufiet, P.D. and De Waard, M.; 2011. Antipyretic and antinociceptive effects of *Nauclea latifolia* root decoction and possible mechanisms of action. *Pharm Biol.; 49 (1): 15–25*.

Taj Eldin, I.M., Ahmed, E.M. and Abd Elwahab, H.M. 2010. Preliminary study of the clinical hypoglycaemic effects of *Allium cepa* (red onion) in type 1 and type 2 diabetic patients. *Environmental Health insights; 4: 71-77.*

Talreja, S. and Kaur, C.D. 2014. Fighting diabetes with herbal technological developments. *World Journal of Pharmaceutical research; 3 (2): 2842-2867.*

Tan Paul, V., Boda, M., Enow-Orock, G. E., Etoa, F.-X., Bitolog. P. 2007. Acute and sub-acute

toxicity profile of the aqueous stem bark extract of *Enantia chlorantha* Oliver (Annonaceae) in laboratory animals. *Pharmacologyonline 1: 304-313.*

Tanayen, J.K., Ajayi, A.M., Ezeonwumelu, J.O.C., Oloro, J., Tanayen, G.G., Adzu, B. and Agaba, A.G. 2014. Antidiabetic properties of an aqueous-methanolic stem bark extract of *Spathodea campanulata* (Bignoniaceae) P. Beauv. *British Journal of Pharmacology and Toxicology; 5 (5): 163-168.*

Tanayen, J.K., Ajayi, A.M., Ezeonwumelu, J.O.C., Oloro, J., Tanayen, G.G., Adzu, B. and Agaba, A.G. 2014. Antidiabetic properties of an aqueous-methanolic stem bark extract of *Spathodea campanulata* (Bignoniaceae) P. Beauv. *British Journal of Pharmacology and Toxicology; 5(5): 163-168.*

Tarkang, P.A., Agbor, G.A., Tchamgoue, D.A., Tchokouaha, L.R.Y., Kemeta, D. and Mengue, N.Y.S. 2012. Acute and Chronic Toxicity Studies of the aqueous and ethanol leaf extracts of *Carica papaya* Linn. in Wistar rats. *J. Nat. Prod. Plant Resour.; 2 (5).*

Tchamadeau, M.-C., Dzeufiet, P.D.D., Kouambou Nouga, C.C., Azebaze, A.G.B., Allard, J., Girolami, J.-P., Tack, I., Kamtchouing, P. and Dimo, T. 2010. Hypoglycaemic effects of *Mammea Africana* (Guttiferae) in diabetic rats. *Journal of Ethnopharmacology; 2(3): 368-372.*

Tchikaya, F.O., Bantsielé, G.B., Kouakou-Siransy, G., Datté, J.Y., Yapo, P.A., Zirihi, N.G. and Offoumou, M.A. 2011. *Anacardium occidentale* Linn. (Anacardiaceae) stem bark extract induces hypotensive and cardio-inhibitory effects in experimental animal models. *Afr. J. Tradit. Complement. Altern. Med.; 8 (4): 452-61.*

Tédong, L., Dimo, T., Dzeufiet, P.D.D., Asongalem, A.E., Sokeng, D.S., Callard, P., Flejou, J.F. and Kamtchouing, P. 2006. Antihyperglycemic and renal protective activities of *Anacardium occidentale* (Anacardiaceae) leaves in streptozotocin induced diabetic rats. *African Journal of*

Traditional, Complementary and Alternative Medicines; 3(1): pp 23-35.

Teugwa, C.M., Mejiato, P.C., Zofou, D., Tchinda, B.T. and Boyom, F.F. 2013. Antioxidant and antidiabetic profiles of two african medicinal plants: *Picralima nitida* (Apocynaceae) and *Sonchus oleraceus* (Asteraceae). *BMC Complementary and Alternative Medicine; 13: 175.*

Thomson, M., Alnaqeeb, M.A., Bordia, T., Al-Hassan, J.M., Afzal, M. and Ali, M. 1998. Effects of aqueous extract of onion on the liver and lung of rats. *J. Ethnopharmacol.; 61 (2): 91-9.*

Thongsom, M., Chunglok, W., Kuanchuea, R., Tangpong, J. 2013. Antioxidant and hypoglycemic effects of *Tithonia diversifolia* aqueous leaf extract in alloxan-induced diabetic mice. *Adv. Environ. Biol.; 7(9): 2116-2125.*

Tiong, S.H., Looi, C.Y., Hazni, H., Arya, A., Paydar, M., Wong, W.F., Cheah, S.C., Mustafa, M.R. and Awang, K. 2013. Antidiabetic and antioxidant properties of alkaloids from *Catharanthus roseus* (L.) G. Don. *Molecules; 18: 9770-9784.*

Titanji, V.P.K., Zofou, D., and Ngemenya, M.N. 2008. The antimalarial potential of medicinal plants used for the treatment of malaria in cameroonian folk medicine. *Afr. J. Tradit. Complement Altern. Med.; 5 (3): 302–321, 2008.*

Tiwari, K.A., and Madhusudana Rao, J. 2002. Diabetes mellitus and multiple therapeutic approaches of phytochemicals: Present status and future prospects. *Current Science; 83 (1): 30-38.*

Tiwari, P., Mishra, B.N., and Sangwan, N.S. 2014. Phytochemical and Pharmacological Properties of *Gymnema sylvestre*: An Important Medicinal Plant. *BioMed Research International.*

Tjeck, O.P., Souza, A., Mickala, P., Lepengue, A.N. and M'Batchi, B. 2017. Bio-efficacy of medicinal plants used for the management of diabetes mellitus in Gabon: An ethnopharmacological approach. *Journal of Intercultural Ethnopharmacology; 6(2).*

Togola, A. 2002. Etude de la Phytochimie et de l'activité antipaludique de *Alchornea cordifolia* Schmach. (Euphorbiaceae). *Thèse de PHD, 2001-2002*.

Toma, W., Gracioso, J.S., Andrade, J.D.P., Hiruma-Lima, C.A., Vilegas, W. and Souza Brito, A.R.M. 2002. Antiulcerogenic activity of four extracts obtained from the bark wood of *Quassia amara* L. *Biol. Pharm.; 25 (9): 1151-1155*.

Toma, W., Gracioso, J.S., Hiruma-Lima, C.A., Andrade, F.D.P., Vilegas, W. and Souza Brito, A.R.M. 2003. Evaluation of the analgesic and antiedematogenic activities of *Quassia amara* bark extract. *J. Ethnopharmacol.; 85: 19-23.*

Trabelsi, D., Ammar, A.H., Bouabdallah, F. and Zagrouba, F. 2014. Antioxidant and antimicrobial activities of essential oils and methanolic extracts of tunisian *Citrus aurantium* L. *Journal of Environmental Science, Toxicology and Food Technology; 8 (5): 18-27.*

Tsabang, N., Tsouh Fokou, P.V., Tchokouaha, L.R.Y., Noguem, B., Bakarnga-Via, I., Dongmo Nguepi, M.S., Nkongmeneck, B.A. and Boyom, F.F. 2012. Ethnopharmacological survey of Annonaceae medicinal plants used to treat malaria in four areas of Cameroon. *Journal of Ethnopharmacology, 139: 171-180.*

Uchechi, N.E. And Chigozie, F.O. 2010. Antibacterial activity of *Tetrapleura tetraptera* Taub. pod extracts. *International Journal of Pharma and Bio Sciences; 1: 734.*

Udem, S. and Asogwa, O. 2011. Effects on hematological and biochemical parameters in albino mice fed *Ipomoea batatas* leaf aqueous extract. *Comparative Clinical Pathology; 20 (5): 475.*

Ufelle, S. A, Achukwu, P.U, Ikegwuonu, I.C, Ghasi, S. 2016. Haematological effects of *Gnetum africanum* leave extract in Wistar rats. *Int J Ethnomed Pharmacog;3(1):14-19*

Ukwenya, V.O., Ashaolu, J.O., Adeyemi, A.O., Akinola, O.A., and Caxton-Martins, E.A. 2012. Antihyperglycemic activities of methanolic leaf extract of *Anacardium occidentale* (Linn.) on the

pancreas of streptozotocin-induced diabetic rats. *Journal of Cell and Animal Biology; 6 (11): 169-174.*

Umoh, I., Oyebadejo, S., Bassey, E. and Uko, U. 2013. Chronic Consumption of *Abelmoschus Esculentus* and *Piper Guineense* Induce Testicular-Toxicity in Wistar Rats, Histopathological Finding. *Advances in Life Science and Technology; 14.*

Vadivelan, R., Dipanjan, M., Umasankar, P., Dhanabal, S.P., Satishkumar, M.N., Antony, S. and Elango, K. 2011. Hypoglycemic, antioxidant and hypolipidemic activity of *Asparagus racemosus* on streptozotocin-induced diabetic in rats. *Advances in Applied Science Research; 2 (3): 179-185.*

Vannamalar, S. and Jaykar, B. 2016. Anticoagulant activity of ethanol and aqueous extracts of *Petroselinum crispum* Mill. *International Journal of Pharmacy Review & Research; 6(1): 47-51.*

Varghese, G.K., Bose, L.V. and Habtemariam, S. 2013. Antidiabetic components of *Cassia alata* leaves identification through alpha-glucosidase inhibition studies. *Pharmaceutical Biology; 51(3): 345-349.*

Varghese, J., Tumkur, V.K., Ballal, V. and Bhat, G.S. 2013. Antimicrobial effect of *Anacardium occidentale* leaf extract against pathogens causing periodontal disease. *Advances in Bioscience and Biotechnology; 4: 15-18.*

Vashishtha, V.M., John, T.J. and Kumar, A. 2009. Clinical & pathological features of acute toxicity due to *Cassia occidentalis* in vertebrates. *Indian J Med Res; 130: 23-30.*

Vega-Avila, E., Cano-Velasco, J.L., Alarcón-Aguilar, F.J., Ortíz, M.C.F., Almanza-Pérez, J.C. and Román-Ramos, R. 2012. Hypoglycemic activity of aqueous extracts from *Catharanthus roseus. Evidence-Based Complementary and Alternative Medicine.*

Verma, L., Khatri, A., Kaushik, B., Patil, U.K and Pawar, R.S. 2010. Antidiabetic activity of

Cassia occidentalis (Linn) in normal and alloxan-induced diabetic rats. *Indian J. Pharmacol.; 42(4): 224-228.*

Verma, L., Singour, P.K., A., Chaurasiya, P.K, Rajak, H., Pawar, R.S. and Patil, U.K. 2010. Effect of ethanolic extract of *Cassia occidentalis* Linn. for the management of alloxan-induced diabetic rats. *Pharmacognosy Research; 2(3): 132-137.*

Verma, S., Sharma, H., and Garg, M. 2014. *Phyllantus amarus*: a review. *Journal of pharmacognosy and Phytochemistry; 3(2): 18-22.*

Vijaya kumar, A.D. and Kalaichelvan, P.T. 2011. Antioxidant and antimicrobial activity using different extracts of *Anacardium occidentale* L. *International Journal of Applied Biology and Pharmaceutical Technology; 2 (3): 436-443.*

Vijayalakshmi, S., Ranjitha, J., Devi Rajeswari, V. and Bhagiyalakshmi, M. 2013. Pharmacological profile of *Cassia occidentalis* l. – a review. *Int J pharm Sci; 5 (3): 29-33.*

Vikram, P.K., Malvi, R. and Jain, D. K. 2012. Evaluation of analgesic and anti-inflammatory potential of *Mimosa pudica* Linn. *Int J Curr Pharm Res; 4(4): 47-50.*

Vliet, E. V., 2012. Medicinal plants for women's and children's health in urban and rural areas of Gabon. *Major research project, master Environmental Biology, Utrecht University.*

Vutukuri, V.R., Das, M.C., Reddy, M., Prabodh, S. and Sunethri, P. 2017. Evaluation of Acute Oral Toxicity of Ethanol Leaves Extract of *Catharanthus roseus* in Wistar Albino Rats. *Journal of Clinical and Diagnostic Research: JCDR; 11(3).*

Wang, C., Zhang, T., Liu, J., Lu, S., Zhang, C., Wang, E., Wang, Z., Zhang, Y. and Liu, J. 2011. Subchronic toxicity study of corn silk with rats. *Journal of Ethnopharmacology; 137: 36-43.*

Wang, Z.Q., Zhang, X.H., Yu, Y., Poulev, A., Ribnicky, D., Floyd, E. and Cefalu, W.T. 2011. Bioactives from bitter melon enhance insulin signaling and modulate acyl carnitine content in

skeletal muscle in high-fat diet-fed mice. *Journal of Nutritional Biochemistry; 22: 1064-1073.*

Watcho, P., Achountsa Jeugo, H.G., Mbiakop, C.U., Wankeu-Nya, M., Nguelefack az, T.B and Kamanyi, A. 2012. Hypoglycemic and hypolopidemic effects of *Bersama engleriana* leaves in nicotinamide/streptozotocin induced type-2 diabetic rats. *BMC Complementary and Alternative Medicine; 12: 264.*

Wauthoz, N., Balde, A. and Saïdo, E. 2007. Ethnopharmacology of *Mangifera indica* L. Bark and Pharmacological Studies of its Main C-Glucosylxanthone, Mangiferin. *International Journal of Biomedical and Pharmaceutical Sciences; 1 (2): 112-119.*

Woode, E., Ameyaw, E.O., Boakye-Gyasi, E. and Abotsi, W.K.M. 2012. Analgesic effects of an ethanol extract of the fruits of *Xylopia aethiopica* (Dunal) A. Rich (Annonaceae) and the major constituent, xylopic acid in murine models. *J. Pharm Bioallied Sci.; 4 (4): 291–301*.

Worbs, S., Köhler, K., Pauly, D., Avondet, M.A., Schaer, M., Dorner, M.B., and Dorner, B.G. 2011. *Ricinus communis* Intoxications in Human and Veterinary Medicine-A Summary of Real Cases. *Toxins (Basel).; 3 (10): 1332–1372*.

www.quasix.eu/pdf/4-2/Data_Quassia

Yakubu, M.T and Quadri, A.L. 2016. Safety evaluation of aqueous extract of *Garcinia kola* seeds in male Wistar rats. *Iranian Journal of Toxicology; 10(1).*

Yakubu, M.T., Uwazie, N.J. and Igunnu, A. 2015. Anti-diabetic activity of aqueous extract of *Senna alata* (Fabacea) flower in alloxan-induced diabetic male rats. *Cameroon Journal of Biological and Biochemical sciences.*

Yang, H.N., Kim, D.J., Kim, Y.M., Kim, B.H., Sohn, K.M., Choi, M.J. and Choi Y.H. 2010. Aloe-induced toxic hepatitis. *Journal of Korean Medical Science; 25 (3): 492–495.*

Yang, S.J., Choi, J.M., Park, S.E., Rhee, E.J., Lee, W.Y., Oh, K.W., Park, S.W. and Park C.Y. 2015.

Preventive effects bitter melon (*Momordica charantia*) against insulin resistance and diabetes are associated with the inhibition of NF-kB and JNK pathways in high-fat-fed OLETF rats. *Journal of Nutritional Biochemistry; 26: 234-240.*

Yasir, M., Das, S. and Kharya, M.D. 2010. The phytochemical and pharmacological profile of *Persea americana* Mill. *Pharmacogn Rev.; 4 (7): 77–84.*

Yassa, H.D and Tohamy, A.F. 2014. Extract of *Moringa oleifera* leaves ameliorates streptozotocin-induced diabetes mellitus in adult rats. *Acta Histochemica; 116: 844-854.*

Yeap, S.K., Ho, W.Y., Beh, B.K., Liang, W.S., Ky, H., Yousr, A.H.N. and Alitheen, N.B. 2010. *Vernonia amygdalina*, an ethnoveterinary and ethnomedical used green vegetable with multiple bioactivities. *Journal of Medicinal Plants Research; 4 (25): 2787-2812.*

Yessoufou, A., Gbenou, J., Grissa, O., Hichami, A., Simonin, A.M. and Tabka, Z. 2013. Anti-hyperglycemic effects of three medicinal plants in diabetic pregnancy: modulation of T cell proliferation. *BMC Complem Altern Med; 13: 77.*

Yokozawa, T., Kim, H.Y., Nonaka, G. and Kosuna, K. 2002. Buckwheat extract inhibits progression of renal failure. *J Agric Food Chem.; 50 (11): 3341-5.*

Yousuf, S., Ahmad, A., Khan, A., Manzoor, N. and Khan, L.A. 2011. Effect of garlic-derivedallyl sulphides on morphogenesis and hydrolytic enzyme secretion in *Candida albicans*. *Med Mycol.; 49: 444–448.*

Yu, J., Ma, Y., Drisko, J. and Chen, Q. 2013. Antitumor activities of *Rauwolfia vomitoria* extract and potentiation of carboplatin effects against ovarian cancer. *Current Therapeutic Research; 75: 8–14.*

Zakiah, I., Siti Zatela, H., Noor Rain, A., Adlin, A., Badrul, A., Abdul, R. and Ibrahim, J. 2014. Safety Evaluation of Oral Toxicity of *Carica papaya* Linn. Leaves: A Subchronic Toxicity Study

in Sprague Dawley Rats. *Evidence-Based Complementary and Alternative Medicine.*

Zhang, Y., Li, J., Wu, Z., Liu, E., Shi, P., Han, L., Guo, L., Gao, X. and Wang, T. 2014. Acute and long-term toxicity of Mango leaves extract in mice and rats. *Evidence-Based Complementary and Alternative Medicine.*

Zheng, R., Su, S., Zhou, H., Yan, H., Ye, J., Zhao, Z., You, L. and Fu, X. 2017. Antioxidant/antihyperglycemic activity of phenolics from sugarcane (Saccharum officinarum L.) bagasse and identification by UHPLC-HR-TOFMS. *Industrial Crops and Products; 101: 104-114.*

Table 1: Anti-diabetic plants used in Gabon

Family: Scientific name	**Vernacular name**	**Plant part(s) used/ Traditional preparation**	**Antidiabetic activities**	**Other pharmacological activities**
Amaryllidaceae : ***Allium cepa* L.**	Nyonda	Bulb / Crude	*In vivo:* The consumption of 100 g of onion crude extract reduced FBG in type 1 diabetic patients compared to insulin and lower FBG in type 2 diabetic patients comparing to glibenclamide, after 4 hours. Also, the same dose reduced significantly reduced hyperglycemia in type 1diabetic patients compared to water and insulin and in type 2 diabetic patients compared to water and glibenclamide, after	Hypotensive, Anti-Inflammatory, Antimicrobial Anticarcinogenic, Antimutagenic, Antihyperglycemic, Antioxidant, Neuroprotective, Anticonvulsion (Naseri *et al.*, 2008; Kaiser *et al.*, 2009; Nishimura *et al.*, 2006; El-Demerdash *et al.*, 2005; Santas *et al.*, 2010).

			4h (Taj Eldin et al., 2010). The use of 200 mg/kg bw of S-methylcysteine sulfoxide (SMCS) for 2 months in alloxan-induced diabetic rats ameliorated diabetic conditions compared to glibenclamide and insulin. Also, these doses exhibited antioxidant effects on lipid peroxidation. (Akash et al., 2014).	
Amaryllidaceae : ***Allium sativum* L.**	Garlic	Cloves / Maceration	*In vivo:* Oral doses of 0.1, 0,25 and 0.5 g/kg bw reduced serum glucose, TC, TG levels on diabetic rats comparing to glibenclamide for 14 days (Eidi et al., 2006). *In vitro*: Increasing doses of alliin (0, 10, 20 and 50 uM) incubated with SOD (Superoxide dismutase) at 0.2 mg/ml in presence of glucose (0.5M) or 10 mM MG (Methylglyoxal) or both for 10 days and 37^{o} C showed the therapeutic potential of alliin to prevent glycation-mediated diabetic complication comparable to quercetin effects (Anwar et al., 2017).	Antimicrobial, Antiviral, Antiparasitic, Antiinflamatory, Antihyperlipidemic (*Nwokocha et al.,* 2011; Capasso, 2013; Ashraf *et al.,* 2005; Adler, 2002; Yousuf, 2011; Bayan *et al.,* 2014)
Anacardiaceae: ***Antrocaryon***	Osome élé, onzabili	Stem bark / Decoction,	Not available in	Antinociceptive and anti-inflammatory

***klaineanum* Pierre**		Maceration	literature	(Fongang et al., 2017)
Anacardiaceae: ***Mangifera indica* L**	Mwiba mutangani	Leaves, Stem- bark, roots, seed / Decoction	*In vivo and in vitro:* The ethanol extract of mango peel at 100, 150 and 200 mg/kg bw administered once for 60 days to STZ-induced diabetic rats reduced FBG, fructosamine and glycolated haemoglobin levels comparable to metformin. The same doses inhibited alpha-amylase and alpha-glucosidase activities with IC_{50} of 4.0 and 3.5 ug/ml respectively (Gondi and Prasada Rao, 2015). In high-fat diet/ STZ-diabetic rats, 20% of MIKF (*Mangifera indica* Kernel Flour) - supplemented diets, impoved fasting blood glucose, hepatic glycogen, glycolated haemoglobin, lipid profile, plasma electrolytes, monaldehyde, and liver function biomarkers in diabetics compared to control and metformin groups, after 21 days of treatment (Irondi et al., 2016).	Antioxidant, Immunostimulant, Anti-allergic, Anti-inflammatory, Antitumor, Antimicrobial, Antiviral (Wauthoz *et al.*, 2007)

Anacardiaceae: ***Pseudospondias longifolia* Engl.**	Ofoss	Stem bark / Decoction, maceration	Not available in literature	Antioxidant and antimicrobial properties (Obiang et al., 2016)
Annonaceae: ***Xylopia aethiopica* (Dunal) A. Rich.**	Mugana	Fruits Leaf / Decoction	*In vivo*: Acetone fraction of *Xylopia aethiopica* (XA) at 150 and 300 mg/kg bw in type 2 diabetic and non-diabetic rats significantly lowered blood glucose level in a dose-dependent manner, serum fructosamine, insulin resistance, serum insulin and glucose tolerance were also improved compared to metformin after 4 weeks' study (Mohammed et al., 2016). Aqueous leaf extract of XA at 200mg/kg bw for 25 days showed beta-cells recovery/regenerative effect, blood glucose decrease in STZ-induced diabetic rats which improved insulin secretion compared to non-treated STZ-diabetic rats (Ofusori et al., 2016).	Antimicrobial, Analgesic, Antioxidant, Antimalarial, Diuretic Hypotensive (Ilusanya *et al.,* 2012; Woode *et al.,* 2012; Mohammed *et al.,* 2015; Karioti *et al.;* 2004; Titanji *et al.,* 2008; Somova *et al.,* 2001) Antidepressant potential, epilepsy, inflammatory disorders, haemorrhoids, bronchitis, rheumatism, anti-inflammatory effects, analgesic, sedative, anticonvulsant, antiproliferative effects (Biney et al., 2016) antioxidant (Tjeck et al., 2017)
Annonaceae: ***Annickia chlorantha* (Oliv.) Setten & Maas**	Mwamba jaune, Muambebengue	Stem barks/ Decoction	Not available in literature	Antimalarial, jaundice, yellow fever, hepatitis B, conjunctivitis, infected wounds, ulcers (Olivier et al., 2015)

Annonaceae: ***Annona muricata* L.**	Soursop	Stem barks/ Decoction	*In vivo:* Leaves aqueous extract at 100 and 200 mg/kg orally administered to normal and STZ-induced diabetic rats, reduced significantly blood glucose levels in diabetic animals by 75% at 100 mg/kg and by 58.22% at 200 mg/kg, after 28 days of treatment, compared to initial value and control group (Ngueguim et al., 2014)	Antimicrobial, anti-inflammatory, antioxidant, larvicide, cytotoxic to tumour cells (Coria-Téllez et al., 2016)
Annonaceae: ***Anonidium mannii* (Oliv.) Engl. & Diels**	Ebom	Stem barks/ Decoction	Not available in literature	Antibacterial activity (Djeussi et al., 2013) and cytotoxic properties (Tjeck et al., 2017)
Apiaceae: ***Petroselinum crispum* (Mill.) Fuss**	Persil	Leaves/ Chewing	*In vivo:* Parsley extract (2g/kg) and Glibornuride (5mg/kg bw) were given daily to STZ-diabetic rats for 28 days. Blood glucose levels, liver non-enzymatic glycosylation decreased in both groups compared to controls. However, liver lipid peroxidation increased in glibornuride group (Ozsoy-Sacan et al., 2006)	Diuretic activity (Ozsoy-Sacan et al., 2006) Antioxidant and antibacterial properties (Tjeck et al., 2017)
Apocynaceae: ***Alstonia boonei* De Wild.**	Emien	Stem barks/ Decoction	*In vivo:* Water extract at 200 and 500 mg/kg bw given orally for 30 days to	Diuretic (Tjeck et al., 2017), antioxidant, antimalarial, anti-

			dexamethasone-induced-hyperglycaemia rats reduced blood glucose level, TG, TC, ALT, AST compared to non-treated rats and comparable to glibenclamide and metformin groups (Nkono Ya Nkono et al., 2014). *In vitro:* Ethyl acetate extract orally administered to Wistar rats significantly reduced blood glucose level within 2h and was the most potent inhibitor of α-amylase (IC50: 3.17 mg/ml) and α-glucosidase (IC50: 0.70 mg/ml) (Kazeem and Ashafa, 2015)	infective, treat arthritis and infertility (Ezuruike and Prieto, 2014)
Apocynaceae: ***Alstonia congensis* Engl**	Mukuka	Root / Decoction, maceration	*In vivo*: Mixture of hydroalcoholic extract of *Alstonia congensis* (AC) bark and *Xylopia aethiopica* fruit (1:1) given once daily, reduced blood glucose levels in Swiss albino healthy mice between doses 50 and 250mg/kg bw after 30 days treatment, compare to the control (Ogbonnia et al., 2008).	Antioxidant Antimalarial (Ogbonia *et al.*, 2008; Awah *et al.*, 2012; Awe *et al.*, 2009)

Apocynaceae: ***Picralima nitida* (Stapf) T. Durand & H. Durand**	Dugundu or Ebam	Leaves, fruits, stem bark, seed / Infusion, maceration, decoction	*In vivo:* Antidiabetic activity of methanol extract of leaves of *Picralima nitida* (PN) (300 mg/kg) in STZ-induced diabetic rats showed significant blood glucose reduction compared to control and glibenclamide groups after 90 min of glucose load (Teugwa et al., 2013). *In vitro:* Akuammicine (3-93 uM) from the chloroform extract of PN seeds stimulated the increase in glucose uptake in fully differentiated 3T3-L1 adipocytes (Shittu et al., 2010). The acetone leaf extract (2.5-10 mg/ml) showed inhibition of alpha-amylase and alpha-glucosidase activities (IC50 of 6.50 and 3.00 respectively) (Kazeem et al., 2013).	Antimalarial, Antipyretic, Analgesic, Anti-inflammatory, Antimicrobial, Antiulcer, Antioxidant, Antiparasitic (Inya-Agha *et al.*, 2006; Erharuyi *et al.*, 2014; Yessoufou *et al.*, 2013)
Apocynaceae: ***Rauvolfia vomitoria* Afzel.**	Mupitugu	Leaves, root bark / Decoction, maceration	*In vivo:* 6 weeks' administration of mixture of *Rauvolfia vomitoria* (RV) and *Citrus aurantium* (0.5 ml/kg bw) to genetic diabetes mice resulted in	Antitumor, Anticonvulsivant, Antimicrobial, Analgesic, Hepatoprotective, Antimalarial Antipsychotic, Antioxidant

			normalisation of blood glucose levels and pancreas protection as compared to control groups (Campbell et al., 2006). Decreased of post prandial and fasting plasma glucose levels in type-2 diabetic patients given daily a mixture of RV and *Citrus aurantium* (tea) for 4 months (Campbell-Tofte et al., 2011). Hypoglycaemic effect at 500, 700 and 1000 mg/kg bw in healthy mice after 4g/kg glucose load (N'doua et al., 2015).	(Olatokunboh *et al.*, 2009; Yu *et al.*, 2013; Amole *et al.*, 2006; Ezejindu *et al.*, 2013; Momoh *et al.*, 2014; Nwodo *et al.*, 2003; Bisong *et al.*, 2011; Okolie *et al.*, 2011)
Apocynaceae: ***Tabernanthe iboga* (Bail.)**	Iboga, diboga	Stem root, stem bark / Decoction, maceration	*In vitro*: Aqueous extract of *Tabernanthe iboga* root barks induced insulin secretion in isolated islets at 1ug/ml in presence of stimulatory glucose concentration [11.1 mM] (Souza et al, 2011)	Anti-addictive, spasmolytic, anti-HIV1, ant fatigue, anti-hunger, anti-psychological troubles (Souza et al., 2011)
Apocynaceae: ***Voacanga Africana* Stapf ex Scott-Elliot**	Ondou or Ontueles	Roots/ Maceration	Not available in literature	Antioxidant and antimicrobial activities (Tjeck et al., 2017)
Aracaceae: ***Cocos nucifera* L.**	Coco	Fiber/ Decoction	*In vivo: Cocos nucifera* influorescence (CNI) methanol extract at 100, 200 and 400 mg/kg bw were	Anti-diarrhea, dysentery (Naskar et al., 2011), cytoprotective and antimalarial activities (Tjeck et al., 2017)

			administered to groups of STZ-induced diabetic male rats for 45 days. CNI extract at 200 mg/kg bw showed better antihyperglycemic effect compared to diabetic control. CnI methanol extract improved glucose metabolism in this study (Renjith et al., 2013)	
Asteraceae: ***Ageratum conyzoides* L.**	Kumba djuma	Whole plant, leaves / Fresh juice, infusion	*In vivo*: Aqueous extract doses of 100, 200 and 300 mg/kg given orally to STZ-rats for 3 weeks lowered serum glucose and improved lipid profile compared with controls (Nyunai et al., 2015). Methanol extract of leaves, stem and root at 100 mg/kg administered orally to normal and STZ-rats reduced FBG, TC, TG, LDL and HDL compared with control and untreated group, after 14 days' treatment (Atawodi et al., 2017).	Analgesic, Antimicrobial, Anti-Inflammatory, Spasmolytic, Emmenagog, Anti-Cancer, Radioprotective, Antioxidant, Cardiovascular activity, Gastrointestinal activity, Antimalarial, Antidiabetic, Anticoccidial, Schistosomicidal (Singh *et al.*, 2013 ; Adebayo *et al.*, 2010 ; Kamboj *et al.*, 2008)**.**
Asteraceae: ***Tithonia diversifolia* (Hemsl.) A. Gray.**	Daisy	Leaves/ Chewing	*In vivo*: Aqueous leaf extract at 500 mg/kg bw showed hypoglycaemic effect in normal mice and lowered significantly blood glucose levels,	Antioxidant, antimalarial, anti-microbial properties, treat hepathitis, infectious dermatitis, fever, diarrhea, ascariasis (Poonsit et

			TC, TG and LDL-cholesterol in alloxan-diabetic mice after 30 days' treatment compared to control and glibenclamide treated mice (Thongsom et al., 2013)	al., 2016)
Asteraceae: ***Vernonia amygdalina* Del.**	Ndolé	Leaves / Decoction	*In vivo:* Leaves ethanol extract at 400 mg/kg given for 28 days exerted the most effective improvement in glucose tolerance, decrease in FBG, in TG and TC levels and exerted pancreatic beta-cells protective effect with slight increase in insulin level of STZ-induced diabetic rats compared to metformin treated rats. This study showed that 400 mg/kg extract increased GLUT4 translocation to plasma membrane suggesting skeletal muscle's glucose uptake stimulation (Ong et al., 2011). Leaves chloroform extract (800 mg-1 g/kg) showed blood and serum glucose-decrease effects in non-diabetic and STZ-induced diabetic rats, in a similar way	Antimicrobial, Antimalarial, Antiparasitic, Antiviral, Antimutagenic, Analgesic, Antipyretic, Anti-Inflammatory, Antioxidant, Hepatoprotective, Anti-cancer (Yeap *et al.*, 2010; Akah *et al.*, 2004)

			of metformin and compared to control, after 14-day administration (Atangwho et al., 2013). A mixture (1:1:1) of leaves 1:3 (weight:water) of *Vernonia amygdalina*, *Ocimum gratissimum* and *Gongronema latifolium* decreased significantly blood glucose concentrations compared to baseline, when given 45 min before OGTT in normoglycemic patients (Ejike et al., 2013).	
Bignioniaceae: ***Newbouldia laevis* (P. Beauv.) Seem**	Ossome-dzo	Stem barks / Decoction	*In vivo:* Aqueous extract of root at 500 and 1000 mg/kg bw significantly reduced serum glucose levels in normal and alloxan-induced diabetic rats after 4h to 6h (Okonkwo and Okoye, 2009). Dichloromethane-methanol extract (DME), hexane fraction (HF), ethylacetate fraction (EF) and methanol fraction (MF) at 250, 500 and 1000 mg/kg decreased significantly, in a dose-dependent manner blood glucose in alloxan-	Cancers, infectious diseases, male infertility, anti-hemorragic (Kuete et al., 2014), antioxidant, antimicrobial potential, anti-inflammatory, anti-malarial (Anaduaka et al., 2014)

			induced diabetic rats compared to control and metformin-treated rats, from 3h after drug administration. Sub-fraction of MF at 50, 100 and 200 mg/kg showed significant blood glucose reduction compared to glibenclamide (Osigwe et al., 2015)	
Bignioniaceae : ***Spathodea campanulata* P. Beauv.**	Tulipier du Gabon	Stem bark, leaves / Decoction	*In vivo:* Aqueous-methanol extract at 800 mg/kg significantly reduced blood glucose in healthy rats after 2h administration. At 200, 400 and 800 mg/kg, the extract after glucose-induced hyperglycaemia, exerted moderate reduction of blood glucose. However, in alloxan-induced diabetic rats the extract significantly reduced blood glucose levels with the highest effect at 400 mg/kg comparable to those of control and chlorpropamide (Tanayen et al., 2014)	Antioxidant, Antimicrobial, Analgesic, Anti-inflammatory, Antimalarial, Anticonvulsant, Wound Healing, Hepatoprotective (Coolborn *et al.*, 2015; Rajesh *et al.*, 2010; Ilodigwe *et al.*, 2009; Ilodigwe *et al.*, 2010; Dhanabalan *et al.*, 2008; Niyonzima *et al.*, 1999; Houghton *et al.*, 2005; Dadzeasah 2012).
Burseraceae: ***Aucoumea klaineana* Pierre**	Okoumé	Stem barks / Maceration	Not available in literature	Anti-inflammatory (Pérez et al., 2011), antioxidant (Koudou et al., 2009)
Burseraceae: ***Santiria***	Ebo, Nkungu	Roots / Decoction	Not available in	Antimicrobial activity (Tjeck et al., 2017),

***trimera* (Oliv.) Aubrév.**			literature	HIV/AIDS (Feuya Tchoua et al., 2015)
Caesalpinioideae: ***Eurypetalum tessmannii* Harms**	Anzillim	Stem barks / Decoction	Not available in literature	
Caesalpinioideae: ***Guibourtia tessmannii* (Harms) J. Leonard**	Kévazigo	Stem barks / Decoction	*In vitro*: 70 ug/ml of aqueous extract induced insulin secretion in beta cells at high glucose concentration (11.1 mg/ml) (Research in progess, PhD Bayissi Bading-Taika)	Hypotensive and antioxidant activities (Madingou et al., 2011)
Calophyllaceae: ***Mammea Africana* Sabine**	Oboto	Stem barks / Decoction	*In vivo:* CH2-Cl2-MeOH stem bark extract from 19 to 300 mg/kg administered to STZ-induced type 1 diabetes rats reduced blood glucose levels after 5h. The maximal anti-diabetic effects, better than those produced by glibenclamide, were obtained at 75 mg/kg during a 21-day period (Tchamadeu et al., 2010)	Anti-malarial fever, anti-microbial, antiplasmodial (Okokon et al., 2007), hepatoprotective, anti-inflammatory, anti-hypertensive, cardioprotective, hypolipidemic, vasorelaxant, analgesic, antioxidant, anti-diarrheal, immunomodulatory, nephroprotective (Okokon et al., 2016)
Cannabaceae: ***Celtis tessmannii* Rendle**	Diania	Stem barks / Decoction	Not available in literature	
Capparaceae: ***Buchholzia coriacea* Engl.**	Magic cola	Seeds / Maceration	*In vivo*: Ethanol extract and butanol fraction of	Antiinflamatory, Antimicrobial, Antiparasitic, Antiulcer,

			Buchholzia coriacea at 250 mg/kg bw each (EEBC and BFBC) decreased FBG in hyperglycemic STZ-mice and normoglycemic rats 4 and 12h, respectively, after administration. EEBC, BFBC and glibenclamide administration significantly reduced FBG level in STZ-rats by 55%, 64%, and 56% respectively (Adisa et al., 2011). Aqueous and methanol extracts at 100, 200 and 400 mg/kg bw administered twice daily, showed a dose-dependent decrease of blood glucose concentration in alloxan-induced diabetic albino rats after 14-days treatment, compared to control and glibenclmide treated rats (Obiudu et al., 2015)	Antispasmodic (Ezike *et al.,* 2015; Adisa *et al.,* 2011; Ajaiyeoba *et al.,* 2003; Fred-Jaiyesimi *et al.,* 2011; Erhirhie *et al.,* 2015; Anowi *et al.,* 2012)
Caricaceae: ***Carica papaya* L.**	Mulolu	Leaves, fruit pulp, seed / Infusion, decoction, juice	*In vivo:* Leaf aqueous extract of *Carica papaya* at 0.75, 1.5 and 3g/100 ml has shown antihyperglycemic and hypolipidemic potentials in alloxan-induced diabetic rats after 30 days	Antioxidant, Antimicrobial, Anticancer, Anti-Inflammatory, Wound Healing, Antiparasitic, Diuretic, Hepatoprotective, Dengue Fever (Sudhakar *et al.,* 2010; Krishna *et al.,* 2008;

		compared to controls and hypoglycemic effect at 100, 200 and 400 mg/kg bw in STZ-induced diabetic rats compared to glibenclamide group after 21 days (Maniyar and Bhixavatimath, 2012 and Juarez-Rojop et al., 2012). Leaf extract (3-125 mg/kg bw) preserves pancreatic islets, improves insulin secretion in STZ-induced diabetic animals compared to insulin after 20 days (Miranda-Osorio et al., 2016) *In vitro:* Healthy pancreatic cells cultured in a presence of leaf aqueous extract (3-12 mg) and/or STZ (6 mg) for 3 days revealed higher insulin levels in the medium containing *Carica papaya* leaf extract comparing to the medium where cells received only STZ (Miranda-Osorio et al., 2016)	Juárez-Rojop *et al.*, 2014)

Convolvulaceae : ***Ipomoea batatas*** **(L.) Lam.**	Mongu	Whole plant, leaves, tubers / Juice extract, infusion, powder	*In vivo*: 4g/day given orally to 61 type 2 diabetic patients decreased significantly fasting blood glucose after 12 weeks. Also after the 2h-glucose levels were significantly lowered in the (4g) group compared to the placebo group (Ludvik et al., 2004). Moreover, (4g/day) treatment improved glucose tolerance due to the amelioration of insulin sensitivity (Ludvik et al., 2003). Aqueous extract of whole plant decreased dose dependently (100-400 mg/kg) blood glucose levels in normal and STZ-induced diabetic rats compared to control and glibenclamide groups (Olowu et al., 2011)	Antimicrobial, Antioxidant, Antidiabetic, Wound Healing Antiulcer, Hepatoprotective, Anti-inflamatory, Antiproliferative, Immunostimulant (Pochapski *et al.*, 2011; Ogunrinola *et al.*, 2015; Panda *et al.*, 2011 ; Panda *et al* 2012).
Combretaceae: ***Combretum micranthum*** **G. Don**	Kinkêliba	Leaves / Infusion	In vivo: Aqueous leaf extract at 100, 200 and 400 mg/kg were administered to normal, sub-diabetic and alloxan-induced diabetic rats. Dose of 100 mg/kg showed significant hypoglycemic and anti-hyperglycemic effects comparable to gliblenclamide at 0.6 mg/kg (Chika and Bello, 2010)	Antibacterial (Tjeck et al., 2017)

Euphorbiaceae: ***Alchornea cordifolia* (Schumach & Thonn.) Mull.Arg.**	Dumbundzen	Leaves / Decoction	*In vivo*: Increasing hypoglycaemic effects at 200, 400 and 800 mg/kg comparing to Glibenclamide in STZ-induced diabetic wistar rats after 28 days (Mohammed et al., 2013).	Anti-Inflammatory, Antimicrobial, Wound Healing, Analgesic, Immunostimulant, Antipyretic, Hepatoprotective, Antioxidant, Antimalarial (Manga *et al.*, 2004; Okeke *et al.*,1999 ; Agyare *et al.*, 2014; Kouakou e *et al.*, 2013; Ishola *et al.*, 2012; Effo *et al.*, 2013; Olaleye *et al.*, 2006; Togola 2002)
Euphorbiaceae: ***Euphorbia hirta* L.**	Ambèningo	Leaves, whole plant / Decoction, maceration	*In vivo*: Ethanolic leaves extract (400 mg/kg bw) reduced blood glucose levels in STZ-induced diabetic rats after 21-days treatment in comparison to glibenclamide (Maurya et al., 2012). *In vitro:* Alpha-glucosidase inhibitory activity and sucrose tolerance effect of quercetrin, dimethoxy quercetrin, hirtacoumaroflavonoside and hirtaflavonoside-B ethyl acetate fraction from *Euphorbia hirta* methanolic extract in comparison to acarbose (Manjur et al., 2015)	Anti-allergic, Anti-inflammatory Diuretic, Antioxidant, Antitumor Antiparasitic, Antimicrobial, Antihypertensive, Antimalarial, Immunostimulant, Anxiolytic, Sedative (Huang *et al.*, 2012; Patil *et al.*, 2009)
Euphorbiaceae:	Puluka	Seeds,	*In vivo*: Roots	Antioxidant,

***Jatropha curcas* L.**		leaves, root, stem bark, whole plant / Decoction, maceration	aqueous extract (250 and 450 mg/kg bw) decreased fasting blood glucose levels in alloxan-induced diabetic rats compared to untreated and Glucophage rats, after 15 days (Aladodo et al., 2013). Blood glucose level reduction or anti-hyperglycemic potential activity compared to control, in alloxan-induced diabetic female rats by aqueous extract of *Jatropha curcas* leaves at 100, 200 and 300 mg/kg bw after 21 days of treatment (Nwamarah et al., 2015).	Antibacterial, Anti-Inflammatory, Anti-ulcer, Antiparasitic, Anti HIV, Gastroprotective, Antitumor, Wound healing, Coagulant and anticoagulant (Sharma *et al.*, 2012; Laxane *et al.*, 2013; Dahake *et al.*, 2013)
Fabaceae: ***Acacia auriculiformis* Benth.**	Akasmani	Leaves / Infusion	Not available in literature	Antifilarial and antioxidant effects (Tjeck et al., 2017)
Fabaceae: ***Mimosa pudica* L.**	Bodji	Leaves / Decoction	*In vivo:* Ethanolic leaves extract at 600 mg/kg given to alloxan-induced Wistar rats decreased significantly blood glucose level compared to metformin at 500 mg/kg 5h after treatment (Sutar et al., 2009)	Antimicrobial and hypolipidemic properties (Tjeck et al., 2017)
Fabaceae: ***Phaseolus vulgaris* L.**	Bean	Fruit / Decoction	*In vivo:* Aqueous extract at 400 mg/kg administered to	Antioxidant, antiproliferative (Ombra et a., 2016)

			normal and alloxan-induced diabetic rats daily for 14 days showed hypoglycemic and anti-diabetic properties compared to control group (Luka et al., 2013)	
Gentianaceae: ***Anthocleista vogelii* Planch.**	Givindu	Root, leaves, stem bark / Decoction, maceration	*In vivo:* Leaves, stem bark and roots methanol extracts (1g/kg) given orally to albino rats for 7 days exhibited blood glucose reduction (Olubomehin et al., 2013). Ethanolic extract of roots (100, 200 and 400 mg/kg) and fractions (ethyl acetate, dichloromethane and hexane) at 200 mg/kg each administered to STZ-induced diabetic rats exerted anti-diabetic and anti-hyperlipidemic activity comparing with glibenclamide (Sunday et al., 2017) *In vitro*: Alpha-amylase inhibitory activity of leaves, stem bark and roots methanol extract (1ml of 250 mg/ml) (Olubomehin et al., 2013)	Antimicrobial Antimalarial, Analgesic, Hepatoprotective (Iroanya *et al.*, 2015; Gboeloh *et al.*, 2014; Osadebe *et al.*, 2014; Mbiantcha *et al.*, 2014; Alaribe *et al.*, 2012)
Gnetaceae: ***Gnetum africanum***	Nkumu	Leaves / Cooking	Not available in literature	Chemoprotection potential and antimicrobial (Tjeck et

Welw.				al., 2017)
Hyperaceae: ***Harungana madagascariensis* Lam. ex Poir.**	Atsui	Leaves / Chewing	*In vivo*: Leaves extract at 200 mg/kg bw administered to alloxan-induced diabetic guinea pig for 28 days reduced significantly blood glucose compared to glibenclamide (0.25 mg/kg bw) group (Kadima et al., 2016)	Anti-inflammatory and antioxidante properties (Tjeck et al., 2017)
Irvingiaceae: ***Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.**	Mwiba, Africa mango, ndôc	Seeds, fruit, leaves, stem bark, roots / Decoction, maceration	*In vivo*: IGOB131 from *Irvingia gabonensis* (150 mg) given in a double blinded manner to overweight/obese volunteers 30-60 minutes before lunch and dinner significantly improved a variety of parameters characteristic including blood glucose (Ngondi et al., 2009). Single oral administration of methanol extract of seeds at doses 150 and 250 mg/kg significantly reduced plasma glucose levels in STZ-induced diabetic rats 2h after administration, with 250 mg/kg more efficient than 150 mg/kg (Ngondi et al., 2006). Long-term anti-diabetic effects of aqueous extract of	Antimicrobial, Hepatoprotective, Anti-Inflammatory, Antiulcer, Analgesic (Kuete *et al.*, 2007; Omonkhua *et al.*, 2012; Gbadegesin *et al.*, 2014; Okolo *et al.*, 1995)

			stem bark at 200 mg/kg bw in STZ-induced diabetic rats was revealed for 24 weeks by a sustained reduction of fasting blood glucose in treated diabetic rats (Omonkhua et al., 2012).	
Lauraceae: ***Persea americana* Mill.**	Muvoka	Seeds, leaves / Decoction, maceration	*In vivo*: Aqueous extract of seed given to alloxan-induced wistar rats at 20, 30 and 40 g/L showed hypoglycaemic activity compared to glibenclamide, also anti-diabetic and protective effects on pancreas, kidneys and liver after 21 days (Ezejiofor et al., 2013). Hydro alcoholic extract of leaves at 0.15 and 0.3g/kg/day given orally to STZ-induced diabetic rats for 4 weeks exhibited reduction in fasting blood glucose levels in comparison with glibenclamide, and improvement in metabolic state via a regulation of glucose uptake in liver and muscles by PKB/Akt activation (Lima et al., 2012) *In vitro*: The in-vitro (rat pancreas) assessment of	Vasorelaxant activity, Analgesic, Anti-inflammatory, Antiulcer Anticonvulsant, Hypotensive, Antiviral, Antioxidant, Antimicrobial, Wound healing, Antihepatotoxic (Yasir *et al.,* 2010; Gomez-Flores *et al.,* 2008; Lima *et al.,* 2012)

			5mg/ml of aqueous extract of *Persea americana* inhibitory effect on alpha-amylase and alpha-glucosidase activities showed that the minimum of leaves extract concentration exhibit the highest IC_{50} (0.28 mg/ml) for α-amylase and peel extract exhibited the highest IC_{50} (0.080 mg/ml) for α-glucosidase (Adelusi et al., 2014)	
Leguminosae: ***Senna alata* (L.) Roxb.** Syn: ***Cassia alata* Linn**	Gitsamuna	Leaves, roots, seed / Decoction	*In vitro*: Alpha-glucosidase inhibitory effect of methanol extract (IC_{50}= 63.75 ug/ml) compared to acarbose (IC_{50}= 107.31 ug/ml) with higher effect of the ethyl acetate (IC_{50}= 2.95 ug/ml) and n-butanol (IC_{50}= 25.80 ug/ml) fractions (Varghese et al., 2013)	Antimicrobial, Antioxidant, Anti-inflammatory, Wound Healing, Bronchorelaxant, (Sule *et al.*, 2011; *Ouédraogo et al.*, 2013; Sagnia *et al.*, 2014; Midawa *et al.*, 2010; Yakubu *et al.*, 2015; Adedoyin *et al.*, 2015)
Leguminosae: ***Senna occidentalis* (L.) Link** Syn: **Cassia occidentalis Linn**	Muwiwisi	Leaves, root / Decoction	*In vivo*: Aqueous extract of whole plant reduced significantly FBG levels in normal and alloxan-driven diabetic rats at 200 mg/kg bw during 21 days and promote pancreas regeneration compared to control (Verma et al., 2010).	Antimicrobial, Antioxidant, Hepatoprotective, Antimalarial, Anti-inflammatory, Analgesic, Antipyretic, (Vijayalakshmi *et al.;* 2013)

			Root ethanol extract has hypoglycaemic activity at 250 and 500 mg/kg bw in STZ-induced diabetes mice compared to control mice and metformin after 21 days (Sharma et al., 2014)	
Leguminosae: ***Tetrapleura tetraptera*** **(Schum. & Thonn.) Taub.**	Gyaga	Seeds, leaves, roots, stem bark / Decoction, infusion	*In vivo:* Fruit aqueous extract (50-800 mg/kg p.o.) reduced in a dose-dependent manner blood glucose concentrations on normal and STZ-diabetic rats compared to chlorpropamide (250 mg.kg) (Ojewole and Adewunmi, 2004). Methanolic leaves extract at 50 mg/kg bw decreased plasma glucose levels after 7 days, compared to glibenclamide and normal. Also, hepato protective effect in alloxan-induced diabetic rats was revealed (Atawodi et al., 2014)	Antihypertensive, Antioxidant, Antidyslipidemia, Wound Healing, Antimicrobial, Anti-Inflammatory, Analgesic, Anticonvulsant, Anti-malarial (Ojewole 2005; Okokon *et al.*, 2007; Bella *et al.,* 2012; Effiong *et al.*, 2014; Uchechi 2010; Aderibigbe *et al.*, 2010**)**
Malvaceae: ***Abelmoschus esculentus*** **(L.) Moench**	Nèfu	Fruit, seed / Decoction, food powder, maceration	*In vivo*: *Abelmoschus esculentus* seed powder (AESP) and *Abelmoschus esculentus* peel powder (AEPP) at 100 and 200 mg/kg reduce blood sugar	Antioxidant, Antiulcerogenic, Diuretic, Antimicrobial, Gastroprotective, Antispasmodic, Nephroprotective (Ngoc *et al.*, 2008;

			levels comparable to glibenclamide and also, reduced hyperlipidemia in STZ-induced rats for 28 days (Sabitha et al. 2011). Antihyperglycemic effect of powder (100 mg/kg) and water extract (100 mg/kg) on alloxan-induced diabetic rats compared to normal and glibenclamide (5 mg/kg) treated rats, after 14 days (Ben-Chioma et al., 2015).	Gemede *et al.*, 2014)
Malvaceae: ***Ceiba pentandra (*L) Gaertn.**	Fromage	Barks, leaves, roots	*In vivo:* Root methylene chloride/methanol extract at 40 and 75 mg/kg bw single dose significantly reduced blood glucose 5h after administration in a time-dependent manner in both normal and STZ-induced diabetic Wistar rats compared to glibenclamide treated rats. Also, the administration twice daily to diabetic rats at the same doses (40 and 75 mg/kg) for 3 days showed significant decreased of blood and urine glucose compared to insulin (Djomeni et al., 2006). Ethyl acetate fraction at 200 mg/kg bw	Antiulcer, Hepatoprotective, Anti-inflammatory, Hypolipidaemic, Antiparasitic, Antioxidant (Elumalai *et al.*, 2012; Anosike *et al.*, 2014)

			decreased significantly blood glucose in alloxan-induced diabetic albino rats compared to normal and glibenclamide treated rats after 12 days (Muhammad et al., 2015). Leaves and bark ethanol extract at 200 and 400 mg/kg exhibited remarkable reduction of blood glucose in alloxan-induced diabetic rats (Muhammad et al., 2016) and STZ-induced diabetic rats compared to normal and glibenclamide rats (Satyaprakash et al., 2013).	
Malvaceae: ***Duboscia macrocarpa* Bocq.**	Akak	Stem barks / Decoction	Not available in literature	Treat toothache, tuberculosis (PROTA)
Malvaceae: ***Hibiscus sabdariffa* L.**	Bukulu	Calix / Infusion, decoction, maceration	*In vivo*: Aqueous calyxes extract at 100 mg/kg bw, administered to STZ-induced Sprague Dawley rats for 28 days, decreased BGL and increased insulin levels in diabetic treated rats compared to normal control and non-treated diabetic rats. Also, this extract prevented liver injury associated with diabetic condition (Husin et al., 2017).	Antibacterial, Antifungal, Antiparasitic, Antipyretic, Antinociceptic, Antioxidant, Anti-Inflammatory, Hepatoprotective, Nephroprotective, Diur etic, Cancer-Preventive, Anti-Hypertensive Anti-Anaemic (Da-Costa-Rocha et al., 2014)

			Ethyl acetate fraction at 100 and 200 mg/kg bw administered for 4 weeks to STZ-induced diabetic rats lower FBG when measured once a week in comparison to non-treated rats. Intra-peritoneal GTT made after 4 weeks showed that 200 mg/kg of the ethyl acetate fraction improved FBG and posprandial blood glucose levels compared to STZ-treated rats (Seung et al., 2018)	
Mimosoideae: ***Cylicodiscus gabunensis* Harms**	Okan	Stem barks / Decoction	Not available in literature	Antiplasmodial, antimicrobial and antimalarial properties (Tjeck et al., 2017)
Mimosoideae: ***Entada gigas* (L.) Fawcett and Rendle**	Coeur de mer	Stem barks / Decoction	Not available in literature	Diarrhoea and antimicrobial (Tjeck et al., 2017)
Mimosoideae: ***Piptadeniastrum africanum* (Hook.f.) Brenan**	Dabéna	Stem barks / Decoction	Not available in literature	Antifungal property, gastroprotective and healing ulcer activity (Tjeck et al., 2017)
Moraceae: ***Milicia excelsa* (Welw.) C.C. Berg**	Obiga	Stem barks / Decoction	Not available in literature	Wound healing and antibacterial properties (Tjeck et al., 2017)
Musaceae: ***Musa paradisiaca* L.**	Digondi	Fruits, roots, leaves, ripe fruits, stem	*In vivo:* Stem juice at the dose of 500 mg/kg bw produced rise in blood glucose	Immunostimulant, Antiulcerogenic, Wound healing, Antiurolithiatic,

		juice / Maceration	level after 6h of oral administration in normal rats. However, the same dose produced a lower rise in blood glucose levels within 1h during glucose tolerance test in sub diabetic rats and even a decrease after 4h in fasting blood glucose levels in severe diabetic animals compared to normal control (Singh et al., 2007). Ethanolic extract of banana peels at 500 mg/kg exhibited minor reduction of blood glucose in normal rats compared to normal, 120 min after extract administration. Also, the same dose showed anti-hyperglycemic effects compared to normal during OGTT and from 90 min (Navghare and Dhawale, 2017)	Hepatoprotective, Antioxidant (Swathi *et al.*, 2011)
Myrtaceae: ***Psidium guajava* L.**	Guava	Stem bark, leaves / Decoction, maceration	*In vivo*: Water leaf (250 and 500 mg/kg/d) administration to high fructose treated rats for 8 weeks, improved insulin resistance, dyslipidaemia and hypertension in a dose-dependent	Anti-Inflammatory, Antioxidant, Wound Healing, Antimalarial, Antitussive, Hepatoprotective, Antimutagenic, Antitumor, Cardiovascular activity, Hypotensive, Antinociceptive

			manner compared to normal control (Mathur et al., 2015). *In vitro*: Aqueous leaves extract at 50, 100, 200 or 400 µg/ml enhanced glucose uptake in rat clone 9 hepatocytes compared to control and insulin group (Fang-Chui et al., 2009).	(Ravi *et al.*, 2014; Gutierrez *et al.*, 2008)
Pandaceae: **Microdesmis puberula Hook.f. ex Planch.**	Inko	Stem barks / Infusion	Not available in literature	Analgesic and anti-stress (Tjeck et al., 2017)
Piperaceae: ***Peperomia pellucida* (L.) Kunth**	Pepper-elder	Leaves / Infusion	*In vivo:* Rats chow was supplemented with (100g) 10% w/w and (200g) 20% w/w of fine powder of leaves for 28 days to alloxan-induced diabetic rats and normal rats. Blood glucose levels in treated groups was significantly reduced compared to control and at levels comparable to glibenclamide group (Hamzah et al., 2012)	Antimicrobial, anticancer, antioxidant, analgesic and anti-inflammatory (Tjeck et al., 2017)
Poaceae: ***Cymbopogon citratus* (DC.) Stapf**	Ditsotsu	Leaves / Decoction, infusion	*In vivo*: Leaves aqueous extract of lemon grass lower in a dose-dependent manner FPG (125-500 mg/kg bw) with the most significant	Antimicrobial, Antioxidant, Antiparasitic, Antimalarial, Anti-Inflammatory, Antimutagenicity, Neurobehaviorial (Shah

			hypoglycaemic effect activity at 500 mg/kg/day compared to non-treated rats after 42 days (Adeneye and Agbaje, 2007). Leaves aqueous extract (1,5 ml/100g bw) reduced elevated blood glucose at week 4 of study in alloxan-induced diabetic rats compared to diabetic non-treated group (Ewenighi et al., 2013). Ethanol and aqueous extract at 200 mg/kg bw each, for a period of 30 days, on normal Wistar rats reduced blood glucose levels compared to normal control (Ademuyiwa et al., 2015)	*et al.*, 2011; *Manvitha et al.*, 2014)
Poaceae: ***Pennisetum purpureum* Schumach**.	Mikuku	Stem / Maceration	Not available in literature	Antioxidant, nutritional and berbicidal (Tjeck et al., 2017)
Poaceae: ***Saccharum officinarum* L.**	Sugar cane	Wine, leaves / Fermentation	*In vivo*: Anti-hyperglycaemic effect of 400 mg/kg bw in alloxan-induced diabetic male rats compared to non-treated and glibenclamide-treated groups, during 21 days (Ojewunmi et al., 2013). *In vitro*: The 30%	Antimicrobial, Antioxidant Diuretic, Antiinflammatory (Eneh *et al.*, 2015*;* Ojewunmi *et al.*, 2013; Palaksha *et al.*, 2015; *Ghiware et al.*, 2012)

			hydroalcoholic fraction at 0.01, 0.05 and 0.1 mg/ml showed significant alpha-glucosidase, sucrase and maltase inhibition and improved glucose uptake in HepG2 cells compared to rosiglitazone (10 μM) and acarbose (10μM) (Zheng et al., 2017).	
Poaceae: ***Zea mays* L.**	Putu	Corn silk, leaves stigma / Decoction	*In vivo*: Polysaccharides of corn silk at 300, 400 and 500 mg/kg bw administered daily on STZ-induced diabetic rats during 4 weeks, reduced blood glucose and serum lipid levels compared to normal and dimethylbiguaninide rats. It also improved glucose tolerance in normal and diabetic rats (Zhao et al., 2012). Anthocyanin-rich purple corn extract at 50 mg/kg lowered FBG, increased c-peptide levels, prevented pancreatic beta cells damage and increased insulin content in type 2 animal model C57BL/KsJ db/db mice during 8 weeks' study and compared to diabetic control and pinitol groups	Antioxidant, Antiinflammatoire, Diuretic Nephroprotective, Antimicrobial Antifatigue, (Balasubramanian *et al.*, 2012; Miura *et al.*, 1996; Parle milind *et al.*, 2013; Nessa *et al.*, 2012)

			(Huang et al., 2015). *In-vitro*: Aqueous and ethanol extracts of ZM kernels (0.67 mg/ml both) inhibited rat intestinale α-glucosidase (13 %) with less efficacy than *S. cerevisae* α-glucosidase (55%) and compared to acarbose. However, extracts were capable of scavenging NO at the level of 0.25 mg/ml and only aqueous extracts were capable of of scavenging O_2^- (Lee et al., 2010)	
Rubiaceae: ***Morinda lucida* Benth.**	Dungatsi, Akeng	Bark, leaves / Decoction	*In vivo*: Aqueous and 50% ethanolic extract both at 120 and 210 mg/kg bw lowered significantly blood glucose levels in alloxan-induced diabetic rats compared to non-treated diabetic and control groups. Aqueous extract, at both doses, was more effective than 50% ethanol extract (Bamisaye et al., 2013).	Analgesic, Hypotensive, Antiplasmodial, Antimicrobial, Antiparasitic, Gastrointestinal activity (Olajide *et al.*, 1999; Lawal *et al.*, 2012).
Rubiaceae: ***Nauclea diderrichii* (De Wild.) Merr**.	Bilinga	Leaves, bark / Maceration	*In vitro*: Barks aqueous extract fractions (1 mg/ml) exhibited very potent inhibitory activity of alpha-glucosidase	Anti-diarrhoea, fever and stomach pains (Lamidi et al., 1995), malaria (Iyamah and Idu, 2015).

			compared to acarbose (10 mM) in human MCF-7 cell line (Agnaniet et al., 2016).	
Rutaceae: ***Citrus aurantium* L.**	Mwali	Peel of fruit, leaves, root, stem bark, stem twigs / Juice, decoction	*In vivo:* Mixture of extract of *Citrus aurantium* fruit and RV foliage given orally at 875 mg for 6 weeks, lowered serum glucose levels in diabetes type 2 model db/db mice compared to non-treated diabetic mice (Campbell et al., 2006). The same mixture given orally, daily for 4 months to type 2 diabetic patients lowered fasting and post prandial plasma glucose compararable to oral anti-diabetic agents (Campbell-Tofte et al., 2011). Alcohol extract of fruit peel at 500 mg/kg significantly reduced blood glucose levels in normal and alloxan-induced diabetic rats compared to tolbutamide (100 mg/kg bw) after 21 days (Sharma et al., 2008).	Antimicrobial, Antimalarial, Anti-Cancer (Trabelsi *et al.,* 2014; Khodabakhsh *et al.,* 2015 ; Bapna *et al.,* 2014; Sharma *et al.,* 2008; Karimi *et al.,* 2012)
Simaroubaceae: ***Quassia amara* L.**	Gisimigali or Mukèdji	Wood powder, stem wood, leaves /	*In vivo*: Aqueous extract of wood powder at 200 mg/kg bw given to normal	Antiparasitic, Antiviral, Anti-inflammatory, Antitumor, Antiulcer, Gastrointestinal activity

		Maceration	and alloxan-induced diabetic rats decreased blood glucose levels in a similar manner to metformin during an OGTT from 90 min (Ferreira et al., 2013). Methanol extract of stem wood at 100 and 200 mg/kg bw reduced significantly elevated fasting blood glucose levels in Nicotinamide-STZ-induced diabetic rats after 14 days of treatment, compared to normal and diabetic rats treated with glibenclamide (10 mg/kg) Also, these doses improved glucose tolerance in normal rats after oral glucose tolerance test (Husain et al., 2011).	(Ajaiyoeba *et al.*, 1999; Apers *et al.*, 2002; Toma *et al.*, 2003; Kupchan *et al.*, 1976; Toma *et al.*, 2002)
Urticaceae: ***Musanga cecropioides* R.BR. ex Tedlie**	Asèng	Leaves, stem bark / Decoction, macertion	*In vivo:* Daily oral administration of the aqueous and ethanol extract of *Musanga cecropiodes* (MC) stem bark at 250, 500 and 1000 mg/kg for 14 days significantly decreased fasting blood glucose in normal and alloxan-induced diabetic rats with higher effect with ethanol extract, compared to metformin (Adeneye et al., 2007). The	Hepatoprotective, Hypotensive, Antioxidant, Anti-inflammatory, anti-nociceptive (Adeneye 2009 ; Feuya Tchouya *et al.*, 2015 ; Sowemimo et al., 2015 ; Aziba 2004 ; Ajayi *et al.*, 2013 ; Emoji *et al.*, 2014)

			water ethanol extract of MC stem bark at 300 mg/kg bw reduced significantly glucose-load induced hyperglycemia in normal wistar rats and at 200, 300, and 400 mg/kg bw in STZ-induced diabetic rats. The extract effects were less efficient than those of glibenclamide (Nyunaï et al., 2016).	
Verbenaceae: ***Lantana camara* L.**	Filawa	Leaves, roots / Decoction, Infusion	*In vivo*: Aqueous ethanol extract, n-butanol and aqueous fractions at 800mg/kg exhibited significant anti-hyperglycemia in normal and alloxan-induced diabetic rats compared to glibenclamide, after 28 days of treatment (Jawonisi and Adoga, 2015)	Antioxidant, Antimicrobial, Anti-ulcerogenic, Wound Healing, Antipyretic, Anti-Hypertensive (Ganesh, 2010; Saxena *et al.*, 2012; Kumar *et al.*, 2015)
Zinginberaceae: ***Zingiber officinale* Roscoe**	Nungutsi mabala	Rhizhome, roots / Maceration	*In vivo/in vitro*: Aqueous rhizomes extract at 100, 300 and 500 mg/kg bw administered orally and daily for 30 days to STZ-induced diabetic rats exerted a dose-dependent anti hyperglycaemic effect with a significant decreased of plasma glucose and increased in glucokinase, phosphorfructokinase	Anticancer, Antiemetic, Anti-Inflammatory, Antinociceptive, Antioxidant, Cardiovascular, Gastrointestinal activity, Antitussive, Immunostimulant, Antiarthritic, Antimicrobial, Radioprotective, Antigenotoxic (Mishra *et al.*, 2012; Asha *et al.*, 2011)

		and pyruvate kinase activities in treated animals compared to normal rats (Abdulrazaq et al., 2011). Ethanol extract of rhizome at 200 mg/kg bw improved significantly insulin sensitivity in a high-fat high-carbohydrate diet-fed rat model with metabolic syndrome after 10 weeks, in comparison with metformin. Also, (S)- [6]-gingerol exerted a dose-dependent (50 to 150 µM) increased of AMPK alpha-subunit phosphorylation in L6 skeletal muscle cells compared to control (Li et al., 2014).

Abbreviations: IP: intraperitoneal; bw: bogy weight; STZ: streptozotocin; GLUT: Glucose transporter; mRNA: messenger RiboNucleic Acid; FBG: Fasting Blood Glucose; FPG: Fasting Plasma Glucose; TG: Triglycerides; TC: Total Cholesterol; OGTT: Oral Glucose Tolerance Test; GTT: Glucose Tolerance Test; HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; IC_{50}: half maximal Inhibitory concentration; HbA: Hemoglobin A; AMPK: Adenosine Monophosphate Protein Kinase; NA: sodium; p.o.: per os; LD_{50}: Lethal median dose

Table 2: Toxicology and active constituents of some Gabonese anti-diabetic plants

Family: Scientific name	**Toxicology**	**Identified active constituents or relevant phytoconstituents from the plant**
Amaryllidaceae: ***Allium cepa* L.**	*Acute toxicity*: 5 Groups of rats were treated orally or by IP with 300, 600, 1200, 2400 and 4800	Allyl propyl disulphide (Lakshmi et al., 2016), S-methylcysteine sulfoxide,

	mg/kg bw of methanol bulb extract. LD_{50}>4800 mg/kg (Oyewusi *et al.,* 2015)	quercetin (Akash et al., 2014)
Amaryllidaceae: ***Allium sativum* L.**	*Acute toxicity*: Rats were given aqueous garlic bulbs extract orally at doses of 100, 1 000, 2 500 and 5 000 mg/kg. LD_{50} was more than 5 000 mg/kg *Subacute toxicity*: 3 groups of rats received respectively 300, 600 and 1 200 mg/kg daily for 5 weeks. No significant changes or alterations have been noticed (Lawal *et al.,* 2016)	S-Allyl cysteine sulfoxide (Lakshmi et al., 2016), alliin (Anwar et al., 2017)
Anacardiaceae: ***Antrocaryon klaineanum* Pierre**	Not available in literature	Flavonoids, alkaloids, reductor compounds, tannins and saponins (Abogo Mebale et al., 2013); proanthocyanidins, phenolic acids (Fongang et al., 2017)
Anacardiaceae: ***Mangifera indica* L**	*Acute toxicity*: No toxicity of leaves extract in mice and rats at maximal dose of 18.4 g/kg bw *Subacute toxicity*: 3 groups of rats were treated for 12 weeks with 100, 300 and 900 mg/kg bw of leaves extract and no toxicity has been reported (Zhang *et al.,* 2014)	Mangiferin- a xanthone glycoside (Rakesh et al., 2015)
Anacardiaceae: ***Pseudospondias longifolia* Engl.**	Not available in literature	Flavonoids, alkaloids, reductor compounds, tannins and saponins (Abogo Mebale et al., 2013)
Annonaceae: ***Xylopia aethiopica* (Dunal) A. Rich.**	*Acute toxicity*: LD50 was 1258.92 mg/kg in mice *Subacute toxicity:* Oxytocic activity on guinea pig uterus	Rich content of alkaloids, flavonoids, tannins, saponins, phenol (Ofusori et al., 2016)

	(Omodamiro et al., 2012). Aqueous extract of fruit from 100 to 300 mg/kg shown toxic effects on liver and kidney Wistar rats (Ozoko et al., 2015)	
Annonaceae: ***Annickia chlorantha* (Oliv.) Setten and Maas**	*Acute and sub-acute toxicity* of the aqueous stem-bark extract were evaluated on Swiss mice (oral doses of 1000, 3000 and 5000 mg/kg) for seven days and rats (daily doses of 250, 500, and 1000 mg/kg) for 42 consecutive days. No death in acute toxicity test. At doses from 1000 mg/kg in the sub-acute toxicity study, animals presented histopathological signs in the liver, lungs and kidneys, and alterations in ALT, AST and platelet counts (Tan *et al.*, 2007)	Flavonoids, terpenes, glycosides, sterols, acetogenins and alkaloids (Olivier et al., 2015)
Annonaceae: ***Annona muricata* L.**	*Acute toxicity:* Rats received 200 and 5000 mg/kg and oral LD_{50} was estimated to be >5000 mg/kg (Ngueguim et al., 2014) *Subacute toxicity:* Doses of 100, 1000, and 2500 mg/kg were administered daily for 14 days. The extract did not produce any toxic effect but higher doses could cause kidney damage and induce negative effect on uterine function (Arthur *et al.*, 2011). In a more recent study, 200, 400 and 800 mg/kg bw were administered daily by gavage for 4 weeks. No death or toxicity sign was recorded (Ngueguim et al., 2015)	Alkaloids, acetogenins, phenolic compounds, vitamins, carotenoids, amides cyclopeptides and megastigmanes (Coria-Téllez et al., 2016)
Annonaceae: ***Anonidium mannii* (Oliv.) Engl. & Diels**	Not available in literature	Alkaloids, phenols, polyphenols, saponins, sterols, tannins and triterpenes (Djeussi et al., 2013)

Apiaceae: ***Petroselinum crispum* (Mill.) Fuss**	*Acute toxicity:* No mortality found up to dose 2000 mg/kg on mice of ethanolic and methanolic leaf extracts (Vannamalar and Jaykar, 2016)	Sulphonylureas (glibornuride) (Ozsoy-Sacan et al., 2006) phenolics compounds, flavonoids (apigenin, apiin and 6''-Acetylapiin), essential oil (myristicin and apiol) and coumarins (Farzaei et al., 2013)
Apocynaceae: ***Alstonia boonei* De Wild.**	*Subacute toxicity:* 200, 500 and 1000 mg/kg of aqueous stem bark extract were orally administered daily for 4 weeks to rats. The aqueous extract is toxic on liver and kidney at high doses (Nkono Ya Nkono *et al.*, 2015)	Saponins and indole alkaloids. Alkaloids, tannins, steroids, glycosides, flavonoids, and terpenoids. Triterpenes (Tjeck et al., 2017)
Apocynaceae: ***Alstonia congensis* Engl.**	Not available in literature	Alkaloids, polyphenols and terpenoids (Ogbonia et al., 2008)
Apocynaceae: ***Picralima nitida* (Stapf) T. Durand & H. Durand**	*Acute toxicity:* Oral administration of 600, 750, 1000, 1500 and 3000 mg/kg to mice did not exert any mortality *Subacute toxicity:* Toxic effect on the liver, kidneys and the lungs (Kouitcheu Mabeku *et al.*, 2008). Pancreas degeneration in methanol seeds extract treated groups (Akinloye et al., 2014)	Akuammicine, 10-deoxya-kuammine, akuammine, akuammidine, burnamine and picraline (Teugwa et al., 2013)
Apocynaceae: ***Rauvolfia vomitoria* Afzel.**	*Acute toxicity:* No toxicity up to a concentration of 5000 mg/kg bw in mice by oral route (N'doua et al., 2015) *Subacute toxicity:* Teratogenic (Eluwa *et al.*, 2013) and possible toxicity on liver and kidney (Eteng *et al.*, 2009)	Reserpine, Yohimbine, Ajmaline, Ajmalicine, Alstonine, Serpentine Apigenin rhamnoside, Naringin (Campbell-Tofte et al., 2011)
Apocynaceae: ***Tabernanthe iboga* (Bail.)**	*Acute toxicity:* LD_{50} of ibogaine is 263 mg/kg of mouse b.w. and	Ibogaine, tabernanthine, ibogamine, iboluteine and

	LD_{50} of noribogaine is 630 mg/kg of mouse bw (Kubilienė et al., 2008). LD_{50} of ibogaine is respectively 82 mg/kg b.w., (IP), 327 mg/kg bw (intragastric) and 145 mg/kg (IP) for guinea pig and rats (Goutarelet al., 1993)	ibogaline (Mačiulaitis et al., 2008)
Apocynaceae: ***Voacanga Africana* Stapf ex Scott-Elliot**	The *subacute toxicity* was evaluated after a daily oral dose of aqueous leaf extract (100, 400 and 800 mg/kg) for 28 days to animal's study. No gross abnormalities or histopathological changes were observed among any the groups treated (Igbe *et al.,* 2015)	Anthranoids, anthraquinone, cardiac glycosides, phenols, phlobatanins, starch and tannins. Ibogamine, voacamine, vobasine, voacangine, voacristine, 19-epi-voacristine and 19-epi-heyneanine (Tjeck et al.2017)
Aracaceae: ***Cocos nucifera* L.**	*Acute toxicity:* A single dose of 175, 550, 2000 and 5000 mg/kg of Fermented Virgin Coconut Oil was administered orally in rats and no mortality or gross toxicity were seen (Ah *et al.,* 2016)	Phenolic compounds, flavonoids, resins, alkaloids, carbohydrate, proteins, and fibers. Tannins, saponins, glycosides, steroids and anthraquinones (Tjeck et al., 2017)
Asteraceae: ***Ageratum conyzoides* L.**	*Acute toxicity:* Groups of rats received orally doses of 1, 2, 4, 8, 12 and 16 g/kg of aqueous extract from the whole plant. The LD_{50} was 10.1 g/kg *Subacute toxicity:* For 4 weeks', 2 groups of rats received 0.5 and 1 g/kg of extract respectively. No changes in the general condition was noticed (Igboasoiyi et al., 2007)	Alkaloids and cardenolides (Agunbiabe et al., 2012). Coumarin, Quercetin and its glycosides, Kaempferol and its glycosides, β- sitosterol, Friedelin, Stigmasterol, Echinatine, Lycopsamine, Polymethoxylated and Polyhydroxy flavones (Okunade, 2002)
Asteraceae: ***Tithonia diversifolia* (Hemsl.) A. Gray.**	*Acute toxicity*: 3 groups of rats received orally 800, 400 and 1600 mg/kg of ethanolic aerial part extract. Haematological and toxic effects on the kidney and liver. The LD_{50} was greater than 1600 mg/kg (Elufioye *et al.,*	Flavonoids, tannins, saponins, steroids and terpens. Tannins and saponins. Sugars, sesquiterpenes lactones and phenolics (Tjeck et al., 2017)

	2009)	
Asteraceae: ***Vernonia amygdalina* Del.**	*Acute toxicity:* I.P. LD50 of 500 mg/kg. (Ojaiko and Nwanjo, 2006) *Subacute toxicity:* 200, 400 and 600 mg/kg of aqueous leaves extract were administrated orally to rats for 29 days. No significant changes were recorded (Nabukenya *et al.*, 2014)	Dicaffeoyl-quinic acid, 1,5-dicaffeyol-quinic acid, chlorogenic acid and luteolin-7-O-glucoside (Atangwho et al., 2013; Ong et al., 2011)
Bignioniaceae: ***Newbouldia laevis* (P. Beauv.) Seem.**	*Acute toxicity*: LD_{50} on mice was 5400 mg/kg *Subacute toxicity:* 3 groups of rats received 150, 300 or 500 mg/kg bw of the ethanolic leaf extract orally once daily for 28 days. No significant change was observed except for the platelet count that was high at high doses (Kolawole et al., 2013)	Chrysoeriol, newbouldiaquinone; 2-acetylfuro-1,4-naphthoquinone, 2-hydroxy-3-methoxy-9,10-dioxo-9,10-dihydroanthracene-1-carbaldehyde, lapachol, beta-sitosterol-3-O-beta-D-glucopyranoside, oleanolic acid, canthic acid, newbouldiamide and 2-(4-hydroxyphenyl) - ethyltrioctanoate (Tjeck et al., 2017) flavonoids, triterpenes, anthraquinones, phenols, saponins, alkaloids (Kuete et al., 2014)
Bignioniaceae : ***Spathodea campanulata* P. Beauv.**	*Acute toxicity:* No toxicity was found in Swiss albino mice at a dose of 250 mg/kg of ethanol leaves extract (Coolborn et al., 2012)	Triterpernes (N'guessan et al., 2009), steroids, flavonids, saponins, alkaloids and cardiac glycosides (Kulkarni et al., 2014)
Burseraceae: ***Aucoumea klaineana* Pierre**	Not available in literature	Momoterpenoids (Koudou et al., 2009)
Burseraceae: ***Santiria trimera* (Oliv.) Aubrév.**	Not available in literature	Triterpenes. Alpha-pinene, beta-pinene. Alpha-humulene and beta-caryophyllene (Tjeck

		et al., 2017)
Caesalpinioideae: ***Eurypetalum tessmannii* Harms**	Not available in literature	Not available in literature
Caesalpinioideae: ***Guibourtia tessmannii* (Harms) J. Leonard**	*Acute toxicity:* Mice received oral doses of aqueous stem bark extract (2 000, 3 000 and 5 000 mg/kg) LD_{50} *per os* was greater than 5 000 mg/kg. At 150, 250, 300, 500 and 600 mg/kg bw given by IP LD_{50} was 328.78 mg/kg *Subacute toxicity:* After a single daily administration of extract at 150, 1 500 and 3 000 mg/kg *per os* for a period of 28 days, no significant changes have been recorded (Madingou *et al.*, 2016)	Triterpenes, sterols, alkaloids, tannins, polyphenols, sugars and saponosides (Madingou et al., 2016)
Calophyllaceae: ***Mammea Africana* Sabine**	*Acute toxicity:* Mice were treated by IP with doses ranging from 50 to 1000 mg/kg of the ethanolic stem bark extract. The intraperitoneal LD50 was 387.3 mg/kg *Subacute toxicity:* The extract was administered by gavage to three groups of 5 animals at 30, 60 and 90 mg/kg on alternate days for 21 days. No changes have been noticed (Antia et al., 2006)	5, -7-dihydroxy-8-(12- methyl-butryl) – 4 –N - pentylcoumarins, 4-phenyl and 4-alkylcoumarins, mesuxanthone B (Okokon et al., 2007; Okokon et al., 2016)
Cannabaceae: ***Celtis tessmannii* Rendle**	Not available in literature	Not available in literature
Capparaceae: ***Buchholzia coriacea* Engl.**	*Acute toxicity*: 250, 500, 1000, 2000 mg/kg of the methanol seed extract was administered by IP. The LD_{50} was greater than 2000 mg/kg. (Eze *et al.*, 2016) *Subacute toxicity*: Animals were	Tannins, flavonoids, cardiac glycosides, saponins, alkaloids, and flavone glycosides (Adisa et al., 2011; Obiudu et al., 2015)

	treated per os with 500, 250 and 125 mg/kg of methanolic seed extract once daily for 28 days. Anaemia, congestion of the liver and lungs and signs of liver atrophy were observed in male rats (Nweze *et al.*, 2012)	
Caricaceae: ***Carica papaya* L.**	*Acute toxicity:* Fixed doses of 5, 50, 300 and 2000 mg/kg of leaves extract were administered to rats. No signs of toxicity and no deaths were recorded (Halim *et al.*, 2011) *Subacute toxicity*: 0.01, 0.14, and 2 g/kg bw of the leaves extract were administered orally to rats for 13 weeks. The extract did not cause any significant toxic effect (Zakiah *et al.*, 2014)	Cryptoglavine, cis-violaxanthin and antheraxanthin (Lakshmi et al., 2016)
Convolvulaceae: ***Ipomoea batatas* (L.) Lam.**	*Acute toxicity:* Oral doses (10.0, 12.5, 15.0, 17.5, and 20.0 g/kg) of water extract from the whole plant were administered to mice. The extracts did not induce lethality or mortality up to 10 g/kg. However, a dose-dependent mortality effect between 12.5 g/kg and 17.5 g/kg was recorded giving an LD_{50} of 12 g/kg *Subacute toxicity*: Rats were orally administered 100, 200 and 400 mg/kg/day of the extract, for 14 days. No toxic effects have been recorded (Olowu, *et al.*, 2011)	Abietadiene (Lakshmi et al., 2016)
Combretaceae: ***Combretum micranthum* G. Don**	*Acute toxicity:* Rats were treated with 10, 170 100, 1000, 1250, 1750, 2500, 3500 and 5000mg/Kg of the aqueous leaf extract. No mortality up to 5000	Gallic acid, rutin trihydrate, (+) - catechin and benzoic acid. Alkaloids, saponins, tannins, anthraquinones, cardiac glycosides, flavonoids, and

	mg/kg was observed. *Subacute toxicity:* Rats were treated with dose of the extract at 500 and 1000mg/Kg once daily up to seven days. The results showed liver damage (Muttaka *et al*., 2016)	steroids (Tjeck et al., 2017)
Euphorbiaceae: ***Alchornea cordifolia* (Schumach and Thonn.) Mull.Arg.**	*Acute toxicity*: Aqueous leaf extract LD_{50} values were 8.6 g/kg and 3.8 g/kg in male and female mice respectively (Djimeli *et al.,* 2017) *Subacute toxicity:* Groups of rats were respectively administered 125, 250, 500 and 750 mg/kg bw of ethanolic leaf extract intra peritoneally daily for two weeks. The plant extract is relatively non-toxic but may induce hepatic injury at high doses (Ezeokeke *et al*., 2017)	Cyanogenetic glycosides, saponins, flavonoids, tannins, cardiac glycosides, steroids and triterpenoids (Mohammed et al., 2012)
Euphorbiaceae: ***Euphorbia hirta* L.**	*Acute toxicity:* A single dose of 5000 mg/kg did not produce treatment related signs of toxicity or mortality in any of the animals tested during the 14-day observation period. The LD_{50} was estimated to be greater than 5000 mg/kg *Subacute toxicity:* In the repeated dose 90-day oral toxicity study, the administration of 50 mg/kg, 250 mg/kg, and 1000 mg/kg/day of *Euphorbia hirta* extract per b. w. revealed no significant morphological alteration of the organs (*Ping et al.,* 2013)	Quercetrin, dimethoxy quercetrin, hirtacoumaro-flavonoside and hirtaflavonoside-B (Manju et al., 2015), triterpenes, phytosterols, tannins, polyphenols and flavonoids (Kumar et al., 2010), saponin, alkaloids (N'Guessan et al., 2015)
Euphorbiaceae: ***Jatropha curcas* L.**	*Acute toxicity:* LD_{50} of 1 mg/kg on mice by IP. Haemorrhage of	Diterpenoids, alkaloids, flavonoids, phenols

	the liver, lungs and stomach leading to death was induced at high doses in mice (Abdu- Aguy *et al.,* 1986). LD_{50} of 2500 mg/kg on mice by oral route and potential hepatotoxicity effect (Nwamarah et al., 2015)	(Abdelgadir and Staden, 2013)
Fabaceae: ***Acacia auriculiformis* Benth.**	Not available in literature	Triterpenoid saponins. Proacaciaside and acacia mini. Tetrahydroxyflavanone, teracacidin, and trihydroxyflavanone, phenols, and tannins, proanthocyanidins (Tjeck et al., 2017)
Fabaceae: ***Mimosa pudica* L.**	*Acute toxicity:* Animals were treated at different doses (5, 50, 300 and 2000 mg/kg). Behavioural changes were observed. At 2000 mg/kg (p.o.) the extract showed certain changes in activity and was devoid of any toxicity, thus >2000 mg/kg was taken as LD_{50} (Vikram *et al.,* 2012)	C-glycosylflavones. Terpenoids, flavonoids, glycosides, alkaloids, quinines, phenols, tannins, saponins, and coumarins (Tjeck et al., 2017)
Fabaceae: ***Phaseolus vulgaris* L.**	*Subacute toxicity:* Each animal received 10 mL/kg bw *via* oral intubation doses of 625, 1250, and 2500 mg/kg for a period of 31 days (males) or 32 days (females). No mortalities or significant changes have been observed (Chokshi, 2007)	Alkaloids, anthraquinone, catechic tannins, flavonoids, gallic tannins, glycosides, polyphenols, saponins, steroids and terpenoids (Ocho-Anin Atchibri et al., 2010)
Gentianaceae: ***Anthocleista vogelii* Planch.**	*Acute toxicity*: 3 groups of rats were given 10, 100 and 1000 mg extract/kg body weight (p.o.) of root hydroethanolic extract. The LD_{50} of extract was $\geq$ 5000 mg/kg (p.o.) *Subacute toxicity:* Rats were given 100, 200 and 400 mg/kg of extract (p.o) daily for 28 days.	Secoiridoids, nor-secoiridoids, xanthones, phytosterols, triterpenes, alkaloids (Anyanvu et al., 2015)

	No significant toxic effects have been recorded (Sunday *et al.,* 2016)	
Gnetaceae: ***Gnetum africanum* Welw.**	*Acute toxicity*: 7 groups of mice were treated with 10, 100, 1000, 1500, 2000, 2500 and 3000 mg/k methanol leaf extract. The results revealed an oral LD_{50} of 3000 mg/kg *Subacute toxicity*: 3 groups of rats were orally administered doses of the crude extract (100, 200 and 300 mg/kg) daily for 30 days. No adverse effects have been recorded (Ufelle *et al.,* 2016)	Phenolic compounds, flavonoids, phytosterols, alkaloids, tannins, saponins, chlorophyll, and glycosides. β-caryophyllene, (E)-phytol and trimethyl-2-pentadecanone (Tjeck et al., 2017)
Hyperaceae: ***Harungana madagascariensis* Lam. ex Poir.**	*Acute toxicity:* LD_{50} of aqueous leaf extract were 11.6 g/kg and 13.2 g/kg bw for female and male mice respectively (Kengni *et al.,* 2013) *Subacute toxicity:* 25, 50, 100, 200 mg/kg bw of the aqueous leaf extract were administrated orally to rats for 14 days. the extract induced hypercholesterolaemia and liver damage at high doses (Kengni *et al.,* 2016)	Polyphenols, tannins, and triterpenes. Alkaloids, saponins, and flavonoids (Tjeck et al., 2017)
Irvingiaceae: ***Irvingia gabonensis* (Aubry-Lecomte ex O'Rorke) Baill.**	*Acute toxicity:* 6 groups of rats received orally leaf extract at 10, 100, 1000, 1600, 2900 and 5000 mg/kg bw. The LD_{50} of the ethanolic leaf extract was above 5000mg/kg (Ewere *et al.,* 2016) *Subacute toxicity:* Rats received orally 100, 1000 and 2000 mg/kg of aqueous leaf and stem bark extracts for 56 days. The plant may induce testicular	Flavonoids, alkaloids, cardiac glycosides, terpenoids, tannins and saponins (Aw and Fi, 2010)

	degeneration from 1000 mg/kg bw (Ezeasor *et al.*, 2017)	
Lauraceae: ***Persea americana* Mill.**	*Acute toxicity:* 5 groups of rats were administered by oral gavage doses of 125, 250, 500, 1000, and 2000 mg/kg of ethanolic extract of seed. LD_{50} was 1200 mg/kg (Padilla-Camberos *et al.*, 2013). Rats received orally a single dose of 2000 mg/kg of aqueous, methanolic and ethanolic extracts of the leaves. No death was recorded (Kamagate *et al.*, 2016)	Alkaloids, glycosides, saponins, tannins, and flavoinoids (Ezejiofor et al., 2013), kaempherol, phenol (Adelusi et al., 2014)
Leguminosae: ***Senna alata* (L.) Roxb.**	*Acute and subacute toxicity* were carried out with doses of 1,000, 2,000, and 3,000 mg/kg bw of alcoholic leaf extract, through oral administration for 15 days. This extract may be safe by oral route (Roy *et al.*, 2016)	Anthraquinone glycosides, chrysophanol, emodin, rhein, aloe-emodin and chrysophanic acid, sesquiterpene and phenolic compounds, wanthone, cassiollin, kaempferol (Ghani, 2003; Asolkar et al., 1992; Fernand et al., 2008)
Leguminosae: ***Senna occidentalis* (L.) Link**	*Acute toxicity:* Seeds (beans) induced acute hepato toxicity and myoencephalopathy in children and brain, liver and striated muscles toxicity to animals; LD_{50} >1 g/kg on mice and rats by IP (Vashishtha *et al.*, 2009). No toxicity of the ethanol extract up to 2000 mg/kg bw (Sharma et al., 2014) *Subacute toxicity*: 3 groups of rats were orally treated with 0.10, 0.50 or 2.5 g/kg/day for 30 days of hydroalcoholic extract from stem and leaves. The results showed no toxicity in	Flavonoids, alkaloids, phenolic, tannins, steroids, glycosides and anthraquinones (Kathirvel et al., 2012)

	male and female Wistar rats (Silva *et al.*,2011)	
Leguminosae: ***Tetrapleura tetraptera* (Schum. & Thonn.) Taub.**	*Acute toxicity:* Acetone fruit extract was administered intraperitoneally in a dose range of 7000-12500 mg/kg. LD_{50} was 10 g/kg (Effiong *et al.*, 2015)	Aridanin (Ojewole and Adewunmi, 2004)
Malvaceae: ***Abelmoschus esculentus* (L.) Moench**	*Acute toxicity:* 5 groups of rats received 500, 1000, 2000, 3000 and 4000 mg/kg of gum suspension in normal saline orally. No mortality and toxic manifestations were observed (Kumar, 2014). Doses of ethanol fruit extract of 1000, 2000, 2300, 2400, 2500, 2600, 2700, 3000, 4000 and 5000mg/kg bw were administered to rats. The LD_{50} was 2500mg/kg *Subacute toxicity:* Single dose of 500 mg/kg was administered daily for 28 days. The results showed severe toxicity effect on the testes of albino wistar rats (Umoh *et al*., 2013)	Flavonoid, glycoside, quercetin, coumarin, scopoletin (Lakshmi et al., 2016)
Malvaceae: ***Ceiba pentandra (*L) Gaertn.**	*Acute toxicity:* Ethanol leaf extract was administered at 10, 100, 1 000, 1 600, 2 900, and 5 000 mg/kg to albino rats. Oral LD_{50} >5000 mg/kg (Muhammad et al., 2016) *Subacute toxicity*: Daily oral doses of 100, 400 and 750 mg/kg were administered for 28 days to rats. The results showed no abnormalities in treated groups as compared to the controls (Gandhare *et al.*, 2013)	Flavonoids, tannins (Mohamed et al., 2015)
Malvaceae: ***Duboscia macrocarpa***	Not available in literature	Dubosane. Dubosciasides (Tjeck et al., 2017)

Bocq.		
Malvaceae: ***Hibiscus sabdariffa* L.**	*Acute toxicity*: 6 groups of rats were treated with doses of aqueous extract (200, 400, 800, 1600, 3200 and 6400 mg/kg). LD_{50} found was 3200mg/kg in Wistar rats (Adeyemi *et al.,* 2014) *Subacute toxicity*: Rats were administered orally aqueous extract of calix at 1, 2, 3, 4 and 5g /kg bw respectively for 28 days. Results suggest that high dose of calyx extract may be toxic to liver and kidney (Abubakar *et al.,* 2010)	Flavonoids, tannins, alkaloids, saponins, triterpenes, steroids (Rosemary et al., 2014) and coumarins (Adeyemi et al., 2014)
Mimosoideae: ***Cylicodiscus gabunensis* Harms**	*Acute toxicity:* Plant extract was administrated to rats different concentrations (4, 8, 12 and 16 g/kg bw). LD_{50} found were 11 and 14.5 g/kg p.o., respectively in female and male rats (Mabeku *et al.,* 2007) *Subacute toxicity:* Ethyl acetate extract of the stem bark was administered to Wistar rats at 4 doses (0.75, 1.5, 3 and 6 g/kg p.o.) daily for 6 weeks. Significant physical, clinical and pathological changes were associated with the p.o. administration of the plant extract (Mabeku *et al.,* 2007)	Alkaloids and terpenes. Leucoanthocyanins, saponins, tannins, polyphenols, coumarins, cardiac glycosides, reducing sugars, steroids, flavonoids, sterols and or triterpenes. Gallic acid, oligosaccharides (Tjeck et al., 2017)
Mimosoideae: ***Entada gigas* (L.) Fawcett and Rendle**	Not available in literature	Alkaloids, phenols, and tannins (Tjeck et al., 2017)
Mimosoideae: ***Piptadeniastrum africanum* (Hook.f.)**	*Acute toxicity:* Rats received an oral single dose of methanolic leaf extract (4, 8, 12, 16 and 20	Total phenols, gallic acid, flavonoids, quercetin, tannins, tannic acid and

Brenan	g/kg bw). No death was recorded at all tested doses (Assob *et al.*, 2011)	proanthocyanidins procyanidin (Tjeck et al., 2017)
Moraceae: ***Milicia excelsa* (Welw.) C.C. Berg**	*Acute toxicity:* Ethanol stem bark extract at 100, 1000, 3000, 4000 and 5000 mg/kg bw were administered to the mice. LD_{50} was greater than 5g/Kg. *Subacute toxicity:* Doses of 250, 500 and 750 mg/kg were given to rats orally once daily for 28 consecutive days. The extract was not toxic at the doses investigated (Areola *et al.*, 2015)	Tannins, alkaloids, flavonoids and saponins. Melicilamide A. 3,4-dimethoxybenzyl beta-D-xylopyranosyl -beta-D-glucopyranoside, lupeol acetate, ursolic acid, triacontyl (E)-ferulate, and 2-(3,5-dihydroxyphenyl) benzofuran-5,6-diol. Polyphenol, phenol, triterpenes and glycosides (Tjeck et al., 2017)
Musaceae: ***Musa paradisiaca* L.**	*Acute toxicity*: 7 group of mice were administered different doses (10, 100, 200, 400, 600, 800 and 1000 mg/kg bw) of ethanol leaf extract. The LD_{50} was 489.9 mg/kg (Asuquo & Udobi, 2016) *Subacute toxicity:* Three extracts (petroleum ether, methanol and ethyl acetate) were administered daily at 200 mg/kg bw orally for 28 consecutive days. No noticeable toxicity was recorded in male albino rats (Bera *et al.*, 2013)	Cyclomusalenol, cyclomusalenone (Lakshmi et al., 2016)
Myrtaceae: ***Psidium guajava* L.**	*Acute toxicity:* No harmful effects in rats were recorded after 72h of oral administration of 10-50 mg/100g of leaves water extract (Etuk and Francis, 2003). LD_{50} was 1352 mg/kg. Another study in rats and mice have given LD_{50} of guava leaf extracts > 2g/kg (Fang-Chui et al., 2009).	Quercetin (Fang-Chui et al., 2009), strictinin, isostrictinin, pendunculagin (Lakshmi et al., 2016)

	Subacute toxicity: Hepatoxicity in long-term treatment (Onyekwe et al., 2011)	
Pandaceae: ***Microdesmis puberula* Hook.f. ex Planch.**	*Acute toxicity*: Mice were respectively treated with ethanol root extract at 100, 500, 1000, 1600, 2900 and 5000 mg/kg orally. Oral LD_{50} was higher than 5000 mg/kg *Subacute toxicity*: 200, 400 and 600 mg/kg of the ethanol root extract were administrated between the hours of 10 am and 12 noon daily for 14 days to rats. No significant toxic effect on liver and kidney functions as well as on haematological parameters were recorded. However, alterations in serum lipid profile were observed (Akpanyung *et al*., 2013)	keayanidines A, B, C and keayanine A. Saponins, cardiac glycosides, deoxysugars, alkaloids and terpenes (Tjeck et al., 2017)
Piperaceae: ***Peperomia pellucida* (L.) Kunth**	*Acute toxicity*: Doses of 6.0, 7.5, 9.5, 12.0, 15.0, 19.0, 24.0, 32.0 g/kg were given orally to mice. LD_{50} in male and female adult mice after a 14-day period was 11.78 g/kg (Sio *at al.,* 2001)	Phytol, 2-Naphthalenol, decahydro, hexadecanoic acid, methyl ester and 9,12-octadecadienoic acid (Z, Z) -, methyl ester. Alkaloids, tannins, resins, steroids, phenols and carbohydrate. Flavonoids, glycosides, saponins (Tjeck et al., 2017)
Poaceae: ***Cymbopogon citratus* (DC.) Stapf**	*Acute toxicity:* Mice received orally 8000, 16000 and 32000 mg/kg of essential oil. LD_{50} was estimated at 8,105 mg/kg *Subacute toxicity:* Four double dilutions below the LD_{50} value were given to animals. Each group was received orally a test dilution, daily for 28 days. Histological changes were recorded in the lungs, liver,	Borneol, estragole, methyleugenol, geranyl acetate, geraniol, beta-myrcene, limonene, piperitone, citronellalitrat-2, alpha-terpineole, pinene, farnesol, proximadiol and cymbodiacetal (Ademuyiwa et al., 2015)

	kidney and intestines (Nakavuma *et al.*, 2016)	
Poaceae: ***Pennisetum purpureum* Schumach.**	*Acute toxicity:* 4 groups of rats received orally 100 mg/kg, 1000 mg/kg, 5000 mg/kg and 10000 mg/kg of aqueous stem extract, respectively. LD_{50} found was 7071 mg/kg (Brantley *et al.*, 2015).	Ascorbic acid, rutin, epicatechin, anthocyanins, p-coumaric acid, quercetin, and catechin. Alkaloids, cyanogenic glycosides, flavonoids, oxalates, phytales, saponins, and tannins (Tjeck et al., 2017)
Poaceae: ***Saccharum officinarum* L.**	*Acute toxicity*: 1000 and 2000 mg/kg of aqueous leaf extract were given to mice. No toxicity up to 2000 mg/kg bw was recorded (Ojewunmi, *et al.*, 2013).	Tricin 4-O-guaiacyl-glyceryl ether-7-O-glucopyranoside, genistin, p-coumaric acid, quercetin and genistein (Zheng et al., 2017)
Poaceae: ***Zea mays* L.**	*Subacute toxicity:* Daily consumption of 9.354 and 10.308 g/day/kg bw for male and female rats respectively, did not reveal any observed adverse effect and the no-observed-adverse-effect level was 8.0% (Wang et al., 2011).	Phenolic compounds such as kaempferol, morin, naringenin, feruluc acid, caffeic acid, quercitin, rutin and chloogenic acid (Thiraphattha-navong et al., 2014).
Rubiaceae: ***Morinda lucida* Benth.**	*Acute toxicity:* Toxicity via IP at doses of 500-1500 mg/kg bw (Bamisaye et al., 2013). LD_{50}> 6400mg/kg (Oduola *et al.*, 2010) *Subacute toxicity*: Hepatotoxicity at 120 and 240 mg/kg in alloxan-induced diabetes rats (Bamisaye et al., 2013). Aqueous extract of stem bark was well tolerated at low doses (0.1, 1, and 5 mg/kg bw) and toxic at dose level of 5 g/kg bw at sub-acute administration (Agbor et al., 2012). Also, anti-spermatogenic properties was	Steroids, cardiac glycosides, phenolics, tannins, flavonoids (Ndam et al., 2014)

	found (Raji et al., 2005)	
Rubiaceae: ***Nauclea diderrichii (De Wild.)* Merr.**	Not available in literature	Alkaloids, saponins, flavonoids (Agnaniet et al., 2016), cardiac glycosides, tannins and anthraquinone glycosides (Ibibia et al., 2015)
Rutaceae: ***Citrus aurantium* L.**	*Acute toxicity:* Oral acute toxicity was not revealed up to 5000 mg/kg (Sharma et al., 2008) *Subacute toxicity:* Cardiovascular toxicity due to synephrine (Hansen et al., 2013; Calapai et al., 1999)	Neohesperidin, Naringin (Suryawanshi, 2011)
Simaroubaceae: ***Quassia amara* L.**	Not available in literature	Quassinoids: simalikalactone D, picrasin B, picrasin H, beoquassin, quassin, picrasin I and picrasin J (Houël et al., 2009)
Urticaceae: ***Musanga cecropioides* R.BR. ex Tedlie**	*Acute toxicity:* Ethanol leaf extract was administered at 1, 2 and 3 g/kg (p.o.) to mice. LD_{50}>3 g/kg (Sowemimo *et al.*, 2015) *Subacute toxicity*: Daily oral dose of 750 mg/kg bw was administered to rats for 28 days. No subacute toxicity up to 750 mg/kg bw was recorded (Adeneye et al., 2006)	Alkaloids, phenolic compounds, catechic tanins, flavonoids, and triterpenes (Nyunaï et al., 2016)
Verbenaceae: ***Lantana camara* L.**	*Acute toxicity*: Single dose of 2 g/kg bw of methanol leaf extract was administrated by oral gavage to mice. No obvious toxicity was recorded after 2 weeks (Pour et al., 2011). In another study, 3 groups of rats were administered 10, 100 and 1000mg/Kg bw of the extract	Flavones, isoflavones, flavonoids, anthocyanins, coumatins, lignans, catechins, isocatechins, coumarins, alkaloids, tannins, saponins ans triterpenoids (Saxena et al., 2012)

	respectively, then in a second stage, 1600, 2900 and 5000mg/Kg. No toxicity up to 5000mg/kg bw was recorded. *Subacute toxicity*: 100, 200 and 500 mg/kg doses were given to rats for 4 weeks. Toxicity at chronic stage was observed (asadu *et al.*, 2015)	
Zinginberaceae: ***Zingiber officinale* Roscoe**	*Acute toxicity*: Oral LD_{50} in rats was 4525.5 mg/kg (Abdulrazaq et al., 2011). In another study, 2 groups of rats received orally 2 and 5 g/kg of ethanolic rhizome extract. The extract was safe in doses less than 5 g/kg (Bardi *et al.*, 2013) *Subacute toxicity*: Both male and female rats were daily treated with ethanol extract at 500, 1000 and 2000 mg/kg bw by gavage for 35 days. No mortalities and abnormalities in general conditions were observed except a slight reduction of testes weight (Rong *et al.*, 2009)	Poly penols, vitamin C, β-carotene (Lakshmi et al., 2016)