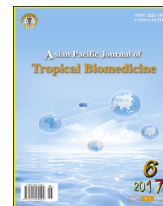




Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Asian Pacific Journal of Tropical Biomedicine

journal homepage: www.elsevier.com/locate/apjtb



Original article <http://dx.doi.org/10.1016/j.apjtb.2017.09.003>

Phyto-metals screening of selected anti-diabetic herbs and infused concoctions

Olanrewaju O. Olujimi^{1*}, Olusegun N. Onifade¹, Adeleke T. Towolawi¹, Temilade F. Akinhanmi², Adeniyi A. Afolabi², Kabir A. Olanite¹

¹Department of Environmental Management and Toxicology, Federal University of Agriculture, PMB 2240, Abeokuta, Ogun State, Nigeria

²Department of Chemistry, Federal University of Agriculture, PMB 2240, Abeokuta, Ogun State, Nigeria

ARTICLE INFO

Article history:

Received 8 Aug 2017

Accepted 8 Sep 2017

Available online xxx

Keywords:

Diabetic
Medicinal plants
Honey
Toxic element
Nigeria

ABSTRACT

Objective: To determine the levels of some selected heavy metals in both the selected anti-diabetic herbal plants and infused concoctions for diabetes treatment.

Methods: Ten anti-diabetic plant samples: pawpaw leaves (*Carica papaya*), bitter melon leaves (*Momordica charantia*), holy basil leaves (*Ocimum sanctum*), bitter leaf (*Vernonia amygdalina*), ginger rhizome (*Zingiber officinale*), garlic (*Allium sativum*), African red pepper fruits (*Capsicum frutescens*), negro pepper grain (*Xylopiya aethiopica*), cashew leaves (*Anacardium occidentale*) and onion bulb (*Allium cepa*) were evaluated for heavy metals. These were digested using standard methods and analyzed for manganese, copper, nickel, chromium, zinc, cadmium and lead using atomic absorption spectrophotometer. The infused concoctions (I and II) prepared from these medicinal herbs administered to diabetic patients were also analyzed for these heavy metals. Concoction I contained all the plants and honey with the exception of *Momordica charantia* and *Ocimum sanctum* which constituted concoction II with water only. The data obtained were subject to descriptive (mean and standard deviation) and inferential (ANOVA and DMRT) statistics.

Results: Chromium and nickel levels were below detection limits in concoction I while manganese [(0.11 ± 0.01) µg/g] and zinc [(0.09 ± 0.01) µg/g] were detected in concoction II. Honey contained manganese [(0.10 ± 0.01) µg/g] and nickel [(0.70 ± 0.01) µg/g]. The anti-diabetic medicinal herbs and infused concoctions (I and II) were observed to contain heavy metals below the compared limits.

Conclusions: The study thus shows that the herbs and concoctions are safe from the heavy metals considered. However, right dosage of the anti-diabetic concoctions should always be considered to prevent possible chronic side effects from bio-accumulation of heavy metals.

1. Introduction

Many of the pharmaceuticals currently available to physician have a long history of usage as herbal remedies, including aspirin, quinine and opium. Most plants produce chemical compounds as part of their normal metabolic activities. Some

plants having been found medicinal are useful for healing as well as for curing human diseases because of the presence of these phytochemical constituents [1]. The chemical compounds from plants are referred to as phytochemicals and are non-nutritive plant chemicals with ill-health protective or preventive characteristics. These chemicals are what plants produced for defense mechanisms but they recently demonstrated that they can help humans and animals fight against ill-health [2]. Medicinal derivative plants are part of traditional health care in most parts of the world thousands of years ago [3]. Medicinal herbs which are confirmed from studies to have anti-diabetic and related beneficial effects are used diabetes treatment [4]. Diabetes mellitus is described as increasing in

*Corresponding author: Olanrewaju O. Olujimi, Department of Environmental Management and Toxicology, Federal University of Agriculture, PMB 2240, Abeokuta, Ogun State, Nigeria.

Tel: +234 0 803 056 6846

E-mail: olujimio@funaab.edu.ng (O.O. Olujimi).

Peer review under responsibility of Hainan Medical University. The journal implements double-blind peer review practiced by specially invited international editorial board members.

plasma glucose concentrations owing to inadequate insulin and insulin resistance, or collectively, resulting in metabolic aberrations of carbohydrates, lipids and proteins [5]. Diabetes mellitus is also described to be an endocrine and metabolic disorder that exhibits significant menace in the millennium [6]. The dominantly detected features of diabetes mellitus are hyperglycemia, hypoinsulinemia and dyslipidemia. The disorders brought about by diabetes are said to be currently controlled by diet, exercise, insulin substitute therapy as well as herbal hypoglycemic agents [7]. The figures obtained from the world ethnobotanists report showed that nearly 800 medicinal plants could be used to regulate diabetes mellitus [8]. Medicinal herbs were observed to be reservoirs of natural products which have possible anti-diabetic effects [9]. Some anti-diabetic plants were confirmed useful traditionally because of their phytochemical compositions and pharmacological actions. The anti-diabetic influence could be traced to the presence of bio-active constituents of medicinal value and different chemical elements which include alkaloids, sterols, essential oils and triterpenes [10].

The different types of compounds (alkaloids, tannins, saponins, flavonoids and glycosides, phenols) determined at varying levels were suggested to be responsible for anti-diabetic activities in several plants screened [9,11,12]. The report of a research by Aderibigebe and Emudianughe [13] showed anti-diabetic activity of aqueous leaves of some medicinal herbs. The hypoglycemic effect of the tested plant was suggested to be by decreasing in intestinal absorption of glucose. Anti-hyperglycemic activity of aqueous stem bark extract of a medicinal herbal was studied [14] with the extract tested on diabetic rats. There was an observation of a significant decrease in blood glucose level. The leaf extract of another herbal medicine was reported for anti-diabetic efficacy in rats [15]. High percentage of countries in Africa depends on traditional medicine, which the World Health Organization (WHO) had recognized since 1978 to have probable usefulness in primary health care. This prompted WHO to devise a guideline framework for the efficacy and safety evaluation of herbal medicine [16,17]. Quite a number of people resorted to herbal medicine as a substitute for conventional remedy with the view that herbal medicine is a natural remedy for diabetes [18]. Conventional drugs had been studied to establish glucose homeostasis by either promoting insulin secretion or uptaking glucose through muscle cells [19]. The conventional drugs are known to have clinical health side effects [20]. Herbal medicines are relatively more cost-effective than synthetic drugs. One of the identified issues with herbal preparation is heavy metal toxicity [21] which often leads to heavy metal poisoning risk to the patients [22–24]. Most of the side effects from herbal medicines high consumption were associated to the poor quality of herbal drugs from the raw ingredients contamination and augmentation of heavy metals to boost effectiveness of the drugs.

Consequently, phytochemicals are subordinate metabolites which are mostly malignant molecules with consequential toxicity when used [25]. Herbal medicines had thereafter come under scrutiny due to their perceived long term toxicity possible from heavy metals accumulation in different parts during growing, processing and handling [26,27]. The levels of harmful heavy metals accumulated depend on growing stage, plant species, category of ion concentration among other factors [28]. Causes of the toxicities of various plants including

herbals are attributable to their chemical and mineral contents. This thus necessitates phyto-screening for quality control [29,30], as metal intake by human could be toxic at higher concentrations while non-essential metals are toxic even though at low concentrations [31]. These metals could be present in various concentrations in the extracts. No human part or system are exempted from suffering adverse effects that are possible when heavy metals get accumulated by human [32,33]. The research thus determined the levels of some selected heavy metals in both the selected anti-diabetic herbal plants and infused concoctions for diabetes treatment.

2. Materials and methods

2.1. Sample collection, preservation and preparation

All the herbal plants for the treatment of diabetes mellitus used during the course of this research were purchased from different locations in Ibadan, Oyo State: eight herbals (green pawpaw leaves, bitter lemon, holy basil leaves, bitter leaves, African red pepper, Negro pepper grain, cashew stem-bark, bulbs of onions) from Ologun-eru and two (garlic and ginger) from Eleyele. All the plants were thoroughly washed in distilled water and air-dried before they were transferred into separate zip-black bags prior to digestion and analysis. Grinding was done using pre-cleaned pestle and mortar.

2.2. Preparation of local anti-diabetic concoction

2.2.1. Materials and preparation of concoction I

The selected medicinal plant materials were 7 green pawpaw leaves, a measure (medium size container) bitter lemon, 10 holy basil leaves, 10 bitter leaves, 10 pods of African red pepper, 15 pieces of negro pepper grain, 1 kg bucket of cashew stem-bark, 5 bulbs of onions, 10 bulbs of garlic, 10 pieces of ginger, 15 L of borehole sourced water and two bottles of honey. The list of the herbal plants used is as presented in Table 1. The collected herbal plants were thoroughly washed with borehole water, properly packed in a pre-cleaned pot: negro pepper grain was first placed in the pot, followed by garlic, ginger, onion, African red pepper, cashew stem-bark, green pawpaw leaves and bitter leaves. Water was then added to the pot level and boiled for 40 min and allowed to be cooled for 24 h. Two liters of honey was then added. The diabetic patients would be expected to take 5 cL glass cup of this concoction I three times a day for two months. These preparations were based on local knowledge.

2.2.2. Materials and preparation of concoction II

Bitter melon, holy basil leaves and borehole sourced water. Ten pieces of these two herbal plants were thoroughly washed with water and their therapeutic contents were extracted with water by infusion, paying little attention to the precise quantity but making the prepared concoction as thick and concentrated as possible. The diabetic patients would be expected to take 1 glass cup of this concoction II three times a day for two months. These preparations were based on local knowledge.

2.3. Methods of extraction: infusion

The extraction method involved separation of active portion of all the herbal plants from the inactive/inert components. For

Download English Version:

<https://daneshyari.com/en/article/8368615>

Download Persian Version:

<https://daneshyari.com/article/8368615>

[Daneshyari.com](https://daneshyari.com)