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Original Article

Assessment of Trace Metals Load and Potential Health Risks Associated with Some Common Tropical Plant Spices in Nigeria

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Abstract *- Common tropical plant spices in Nigeria are consumed as a seasoning, flavoring and preservative as well as for their various roles in human health. However, they can be contaminated with potential toxic metals during planting and in the drying process, hence posing a health risk for the consumers. This study was thus designed to profile the trace metals load in plant spices and assess possible associated health risks to man. Ten (10) different plant spices: Ginger(Zingiberis officinate Roscoe), Garlic(Allium satvum L.), Basil(Ocinum gratissimum L.), African Locust Bean(Parkia clappertonia), Alligator pepper (Aframomum melegueta), Black pepper(Piper guineensis), African nutmeg (Monodora myristica) African pepper (Xylopia aethiopica), Cana pear (Eugelena aromatic) and Anie seed (Pimpinella anisum) were collected from some open vegetable markets in Lagos, and analyzed for potential toxic metals (K, Ca, Zn, Mg, Na, Cu, Cr, Cd, Fe and Pb) using standard procedure involving wet digestion with Nitric and Perchloric acids in ratio 5:1. Health risk assessment indices: Estimated Daily Intake (EDI), Target Hazard Quotient (THQ), and Hazard Index (HI) were calculated. The range of trace metals concentration observed in the decrease order: Ca (1.08 - 236) > Mg (25.4 – 87.8) > K (2.25 – 87.0) > Fe (1.95 – 82.5) >Na (9.0 – 52.3) > Zn (.3 – 2.9) > Pb (ND – 0.13) Cu (0.03 – 0.1) Cr (ND – 0.05) > Cd (ND – 0.03) mg/kg. All trace metals investigated were observed within the allowable limits of the Food and Agricultural Organization / World Health Organization (FAO/WHO) except for Iron, which was observed to be higher than the limit of 20 mg/kg in sixteen percent (16 %) of the entire samples investigated. Estimated daily intakes (EDI) were all below the tolerable daily intake (TDI). The results from this study show no carcinogenic health risk from consuming these plant spices collected in Western Nigeria, hence pointing to man's safety.*

Keywords *- Flavoring and preservatives, Lagos, Potential toxic metals, Risk assessment.*

1. Introduction

Spices could be the root, stem, leaf, fruit, flower, bud and or bark of a plant [1,2]. Spice has been in use for ages, basically for cooking, food processing (coloring and flavoring) [3,4,5] and medicinal uses [6,7,8]. Reports are abundant, showing medicinal properties of various herbal spices: Ginger (Anti-emetic effect, Anti-osteoarthritis effect, anti-inflammatory properties [6,8,9]; Pillai et al., 2011). Fenugreek enhances libido, and masculinity improves the functions of the hormone insulin and blood sugar management [10].

Garlic, though a supplement, can combat sickness and improve heart health, and this has been known from ancient history [11]. Spices are often dried and powdered, thereby improving the shelve life. It can also be used in other forms, such as fresh and pre-ground dried. Planting of spices can be done both at subsistence and commercial levels, particularly in Africa, with substantial economic health and economic implications [12].

The safety study of food materials, particularly herbal, with respect to man, has been receiving increasing attention from food and environmental researchers recently [13,14,15,16], and this is in line with goal 3 (Health and Well-being) of Sustainable Development Goals (SDG). The quality of herbal mixtures can be compromised during harvesting, drying and processing. Possible sources of trace metal contamination in herbal preparations can also be traced to irrigation water, soil pollution, fertilizers and pesticides used, industrial emissions, transportation, and harvesting and storage processes [17,18]. Levels of natural and synthetic chemicals are often determined and related to the allowable ranges and limits by world food regulatory bodies, including the Food and Agricultural Organization (FAO). These chemicals include trace metals (Cd, Pb, As, Ni, Cu and Fe), pesticides [19,20,21] and hormone disruption [22,23]. Common plant spices grown and consumed in Nigeria vary in concentration of heavy metals from places west to the east and northern part of the country with different geographical and environmental conditions.

The variation in heavy metal loads reflects the accumulation of metals in the environment. Additional sources of metals include the pollution caused by heavy metals during the course of cultivation, processes, and storage [24]. Various sources of trace metals in the environment contribute to the metal loads in the soil, air and water and consequently in the plants and herb spices. The anthropogenic sources include industrialization and urbanization of agricultural regions. Other sources of trace metals include the spilling of oil and vandalization of oil pipelines, leachate from dumpsites, chemicals, and fertilizer applications on farms, such as pesticides and fungicides. Some heavy metals have no known biological or beneficial role to man [25,26,27]. They are toxic even at very low concentrations. Potentially Toxic Trace Metals (PTTM) like arsenic, cadmium and lead pose a variety of health risks, such as cancers, miscarriages, metabolic dysfunctions and mutations [28,29].

Heavy metals are persistent in nature, accumulating in the environment and consequently compromising the food web. Some other types of heavy metals are referred to as nutritive metals. They are essential metallic ions in various metabolic activities in man. These trace metals include copper, iron, zinc, and chromium. The possible health risks associated with the consumption of food have been reported in various studies using the following indices: Critical Dietary Intake (CDI), Target Hazard Quotient (THQ), Hazard Index (HI) and Target Cancer Risk (TCR) [30,31,32]. There appears to be a paucity of scientific data on potential toxic metal loads in spices grown or consumed in the western part of Nigeria. Hence, this study is aimed at trace metal characterization of spices from the western part of Nigeria and associated health risk assessment, thereby building up the necessary data for much-needed health policies, thus ensuring the safety of man.

2. Materials and Methods

2.1. Study Materials and Laboratory Pretreatment

Ten different plants and spices were obtained from open vegetable markets in Lagos State. The wet samples were air dried, and all the samples were pulverized into powder using a laboratory mill and kept in a well-labelled, clean zip lock polythene Nylon.

The details of the taxonomic characterization of the plants and spices used in this study through literature are shown in Table 1.0.

2.2. Trace Metals Analyses

2.0 g of powdered spices sample was mixed with 20 ml of Nitric/perchloric acids (5:1) in a conical flask and made to stand overnight, after which the mixture was heated at 80^{o}C for 3 hours.

The clean solution was afterwards heated near to dryness, cool, filtered, and then made up to 100ml with deionized water. The filtrate was then analyzed using the AAS 210VGP model. The analysis was carried out in duplicate.

2.3. Data Analyses

The descriptive statistics of the data from trace metal analysis in the investigated spices are presented in Table 2.0. The study adopted the model [32], through which health risks of trace metals of the investigated spices were determined: Estimated daily intake (EDI) of metal, target hazard quotient (THQ) and Hazard Index (HI) were computed.

The Estimated Daily Intake (EDI) value depends on metal concentrations in spices, the amount of daily consumption and body weight. EDI values of the analysed metals were estimated based on.

Table 1. Details of Taxonomy of plants and herb spices

Scientific Name	Family	Common name	Name Abbreviation	Local name	Parts used
Zingiberis officinate	Zingiberaceae	Ginger	GNG	Ata ile	Fresh rhizomes
Allium satvum L	Liliaceae	Garlic	Locust GLC	Ayu	Fresh bulbs
Ocinum gratissimum L	Amiaceae	Basil	BSL	Efinrin	Fresh leaves
Parkia clappertonia	Minmosaceae	African bean	ALB	Iru	Processed seeds
Aframomum melegueta	Zingiberaceae	Alligator pepper	AGP	Ata ire	Dried seeds
Piper guineensis	Piperaceae	Black pepper	BKP	Iyere	Dried seeds
Monodora myristica	Annonaceae	African nutmeg	AFN	Ariwo	Dried seeds
Xylopia aethiopica	Annonaceae	African pepper	AFP	Eeru	Dried seeds
Eugelena aromatic	Eugelena	Cana pear	CNP	Kanana furu	Dried seeds
Pimpinella anisum	Umbelliferae	Anise seed	AES	Sukuru	Dried seeds

$$EDI = \frac{\text{Cmetal x } IR}{BW} \quad (1)$$

Where EDI is the estimated daily intake, Cmetal (mg/kg) is the average weighted heavy metal content in spices, IR (ingestion rate) is the average daily intake of spices (gram/day/person), BW is the average body weight (Kg) [33]. The average IR of spices for adults is 10 g/day/person of dry weight, similar to the literature. The average body weight for adults was 60.0 kg [34].

Target Hazard Quotient (THQ) is used for the determination of non-carcinogenic risks associated with long-term exposure to contaminants in vegetables, and the calculations were made going by Equation 2

$$THQ = \frac{EDI}{RfD} \quad (2)$$

Where, RfD is the reference dose value for each metal of interest (mg/kg day^{-1}). The RfD values for Pb. Cd, Cr, Cu, Zn and Fe were 0.004, 0.001,0.003, 0.04,0.3 and 0.7 mg kg^{-1} per day, respectively [35]. If HQ is <1, this means that no potential health effects are expected from exposure, while if HQ> 1, it signifies that there are potential health risks due to exposure. *e HQ is calculated as a fraction of the determined dose to the reference dose as

The HI has been developed to estimate the overall non-carcinogenic risk to human health through exposure to more than one pollutant. The Hazard Index (HI) is the total hazard quotients of all heavy metals in spices.

$$HI = THQ (Cr) + THQ (Zn) + THQ (Cu) \quad (3)$$

If the value of HI ≥ 1, this indicates that the population will pose potential adverse health effects, while if HI < 1, the population is unlikely to experience obvious adverse effects [36,37].

Table 2. Concentration of trace metals (mg/kg) in the commonly consumed spices investigated

Spices Metals	Garlic	Ginger	African Locust Bean	Basil	Alligator pepper	Black pepper	African nutmeg	African pepper	Cana pear	Anie seed
Zn	2.25±0.013	2.8±0.012	1.05±0.016	2.9±0.011	1.75±0.014	0.3±0.001	0.6±0.003	2.55±0.011	0.6±0.011	2.05±0.011
Fe	26.3±0.025	16.3±0.010	1.95±0.001	77.5±0.013	26±0.022	2.25±0.002	2.5±0.002	82.5±0.081	10±0.001	7.5±0.006
Cu	0.045±0.0003	0.05±0.004	0.025±0.0002	0.05±0.013	0.03±0.0002	0.025±0.0002	0.03±0.0002	0.1±0.0006	0.03±0.0002	0.03±0.0002
Cd	0.03±0.0002	N. D	N.D	0.03±0.013	N. D	N. D	N. D	0.015±0.0001	0.025±0.0001	0.015±0.0001
Cr	N. D	N. D	N. D	0.03±0.013	0.025±0.0002	0.025±0.0002	0.025±0.0002	0.01±0.0001	0.045±0.0003	0.025±0.0002
Pb	0.075±0.0006	0.05±0.004	v	0.08±0.013	0.03±0.0002	0.075±0.0006	0.13±0.0010	0.13±0.0010	N. D	N. D
Ca	25.1±0.020	24.5±0.019	. 1.08±0.012	12.9±0.013	2.88±0.032	81.5±0.078	17.25±0.017	175±0.130	236.25±0.225	25.4±0.020
Mg	79.5±0.0077	32.25±0.05	17.5±0.018	135±0.013	87.8±0.088	32±0.023	25.4±0.020	78.75±0.075	76.2±0.060	60.05±0.056
Na	32.5±0.038	26±0.022	32.5±0.038	52.3±0.013	16.5±0.014	11.25±0.013	9±0.010	34.5±0.039	23.5±0.014	9±0.010
K	2.25±0.089	32.5±0.38	47.5±0.035	95±0.013	22.5±0.017	11.75±0.014	11.75±0.014	87±0.082	24.95±0.019	175±0.130

3. Results and Discussion

The descriptive analysis of the concentration of trace metals in the ten commonly consumed spices investigated in this study is presented in Table 2.0. In contrast, the allowable limits and ranges of the level of trace metals in spices by the Food and Agricultural Organization / World Health Organization [38] are presented in Table 3.0. The nutrients (metals and non-metals) in spices and herb plants have been extensively reported [39] along with the ash and fiber [40]. The metals investigated in this study can be categorized into i. Essential metals have important roles played in metabolic functioning in living cells. They also contribute to the development of man's immune system man, including iron, copper, zinc, magnesium, potassium, calcium and sodium. ii. Toxic metals are known to have no health-beneficial roles in the functioning of living systems. Chromium, lead, and cadmium are toxic metals involved in this study. Generally, the decrease in order of concentration of metal loads in the spices analyzed is as follows: Mg > Ca > K >Na for essential metals and Pb > Cr > Cd for potentially toxic metals. Zn, Cu, and Fe are though nutritional but toxic to man at elevated levels. The means reported are the average of three replicate analyses based on dry-weight samples.

Table 3. Allowable limits/ranges of trace metals in some common spices by FAO/WHO (2002) #, (2009) *

Metals	Permissible limits (mg/kg)
Zinc	50*
Iron	20 *
Copper	73.3
Cadmium	1.0#
Chromium	0.6 #
Lead	0.3*
Calcium	800m- 1000
Magnesium	375 - 400
Sodium	200 - 250
Potassium	470 - 490

The order of nutritive metals in this study is similar to the Pakistan study [41] but contrary to that of the order presented in the study carried out in Saudi Arabia, where Zn concentration was observed to be higher than Fe and Cu [42]. The variation of metals in these spices or medicinal plants may be due to trace metal load in the environment (particularly in the soils and air) where the plants are grown. Some of these plants are cultivated on a subsistence scale, and some from commercial farms; hence, the impact of chemicals and fertilizers applied may be a good source of metals in these plant species in an environment originating from both natural and man-made sources. These metals enter the food web through industrial, manufacturing and agricultural processes [43].

The concentration of essential metals in the spices analyzed is presented in Table 4.0, and the bar chart and error bars are shown in Figure 1.0.

Table 4. Concentration of nutritive metals in Spices investigated (mg/kg)

Name	k	Na	Ca	Mg
GNG	32.5	26	24.5	32.25
GLC	2.25	32.5	25.1	79.5
BSL	95	52.3	2.88	135
ALB	47.5	32.5	1.08	17.5
AGP	22.5	16.5	2.88	87.8
BKP	11.75	11.3	81.5	32
AFN	11.75	9.0	17.25	25.4
AFP	87	34.5	175	78.75
CNP	24.95	23.5	236	76.2
AES	175	9.0	25.4	60.05
FAO/WHO (2002)	470 - 490	200 - 250	800- 1000	375 – 400

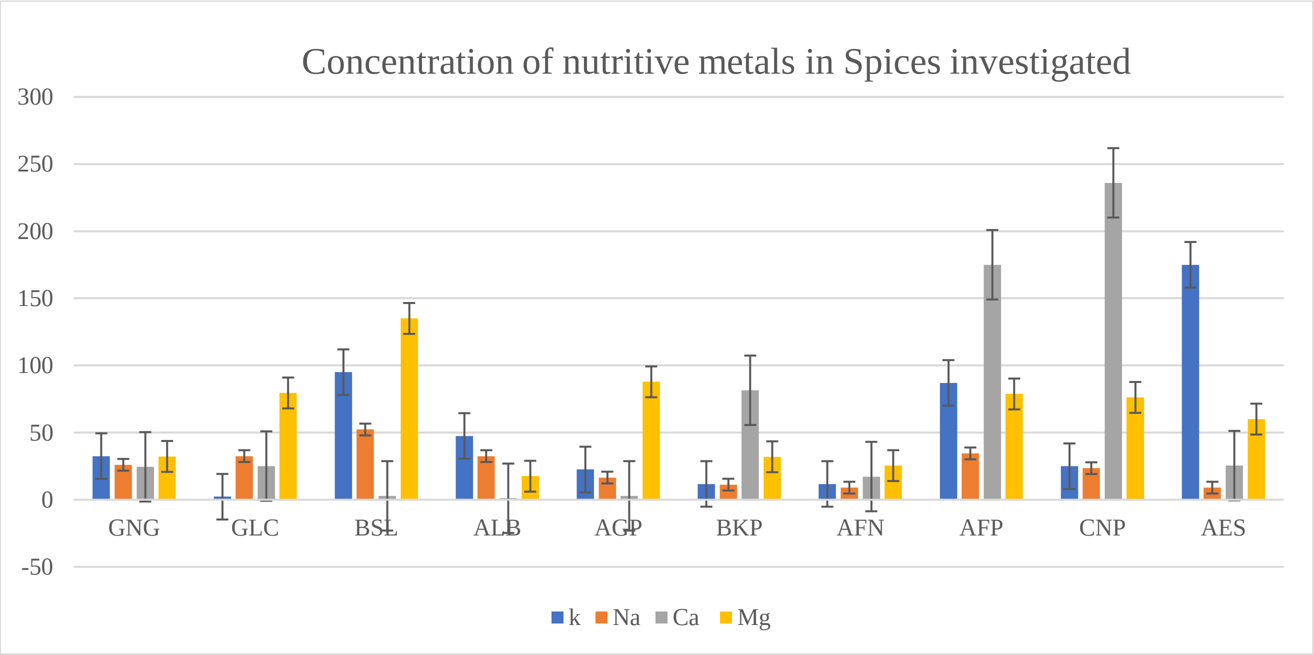

Fig. 1 Bar chart with error bars of nutritive metals in Spices investigated

Magnesium is otherwise known as a crop nutrient and the fourth most abundant mineral in the human body. It helps in chlorophyll formation, hence responsible for preventing poor and stunted growth of plants. The main sources of Mg include the geologic formation of an area. The dolomite (dolomitic limestone) provides both calcium and Mg, which contribute to neutralizing soil acidity. Application of mg fertilizer is the other main source of mg in the soil, including magnesium sulfate, also known as Epsom salt, sulphate of potash magnesia and magnesium oxide, also known as magnesia [44]. Magnesium is a key factor in making several parts of the body and body systems control muscle and nerve functioning, blood sugar levels management, blood pressure and the making of protein, bone, and DNA. Magnesium had the highest metal load in this study (625.5 mg/kg) and compared relative to the study from Bangladesh [40]. Sixty percent of the body's magnesium resides in the bones, while nearly forty percent resides in muscle and soft tissue cells. Lack of magnesium can lead to the following symptoms: numbness, tingling, muscle cramps, seizures and abnormal rhythms of the heart [45,46].

The concentration of magnesium observed in this study ranges from 17.5 to 135 mg/kg with a total load of 624.5 mg/kg, the highest amongst the ten metals in the ten species investigated. Low levels of magnesium have been implicated in a number of diseased conditions, such as type 2 diabetes, heart disease, and Alzheimer's disease [40,47]. Sodium, potassium and calcium are light metals of health importance. They contribute to various metabolic processes in man. All these three metals were observed in the ten spices investigated, ranging from 9.0 to 52.3, 2.25 to 175 and 1.91 to 236.3 mg/kg with a total metal load of 247.1, 510.15 and 551.18 mg/kg for Na, K and Ca respectively. Sodium was highest in Basil (Ocinum gratissimum L), potassium was the highest in Anie seed (Pimpinella anisum), and calcium was observed with highest value in Cana pear (Eugelena aromatic) while Sodium concentration was found lowest in both Anie seed (Pimpinella anisumn) and African nutmeg (Monodora myristica) potassium lowest in Garlic (Allium satvum L.) and calcium observed with lowest value in African Locust Bean (Ocinum gratissimum L.).

Sodium was observed highest in (Ocinum gratissimum L) at 52.3 mg/kg and lowest in African nutmeg (Monodora myristica) at 9.0 mg/kg, just as in Anie seed (Pimpinella anisum). Sodium has been reported to be high in some spices, including celery seed, cumin, dill weed, cloves, and especially parsley flakes, with Na as high as 3 to 9 mg per 2mg [48]. Sodium is an essential metal required for regulating cellular activities and the proper functioning of the nervous system. However, high-sodium food materials can destabilize the fluid and electrolyte balance in the human body system, portending the risk of high blood pressure and heart disease.

Potassium is an essential metal that is helpful to the human system. Potassium helps regulate nerve and muscle cells, including those in the heart. K and Na always maintain a positive correlation in most environmental studies, particularly when the assay is food-related, indicating possible common sources of the two elements. Potassium in this study (510.2 mg/kg) is next to magnesium (624.2 mg/kg) and calcium (551.2 mg/kg) in terms of total metal load in this study. This trend is similar to the result released by [49]. Most potassium in the body (> 90%) is found within cells and organs, while only a small amount circulates in the bloodstream. Excess of potassium in the human body system often leads to a diseased condition known as hyperkalemia, a life-threatening condition with symptoms including paralysis, difficulty breathing, and nausea and vomiting.

Calcium is an essential metal in divalent light that plays an important role in human metabolic activities. It is a macro element that helps in neuromuscular reflexes, blood regulation, cell adhesion, nerve impulse transmission and heart rhythm regulation [50].

Zinc is an essential metal required for many biochemical processes, including wound healing, protein synthesis, immune function, and some enzymatic reactions that enhance metabolism, digestion, nerve function, and many other processes. Zinc, due to its antioxidant properties, helps to mitigate against oxidative stress, which has been linked to some chronic diseases, including high blood pressure, diabetes and age-related muscular degeneration. Low zinc levels may lead to sexual issues in males [51,52]. At the same time, zinc deficiencies have been implicated in several health conditions, such as epidermal, gastrointestinal, central nervous, skeletal, and reproductive systems [53].

Copper is an essential metal. It plays a key role along with iron in bodybuilding. Copper also acts as co factors for some enzymes. It is needed for brain development, proper heart functioning, bone strength and immune functioning. Copper was highest in Xylopia aethiopica and lowest in Parkia clappertonia and Piper guineens. Deficiencies of Cu have been implicated in some health situations, including bone deformations, heart malfunctioning (anxiety and depression) and anemia. Other body health conditions that have been linked to a deficiency include diabetes, Alzheimer's and Parkinson's diseases.

Iron is a mineral that is mainly responsible for the production of haemoglobin in red blood cells and myoglobin, a protein that provides oxygen to muscles. The human body system also requires iron to produce some hormones for the body's proper functioning. Iron disorders in human systems vary from deficiencies and overloads with different clinical characteristics ranging from anaemia to iron cirrhosis [54,55] and neurodegenerative diseases (Abbaspour et al., 2014). Iron concentration in this study ranges from the lowest mean of 1.95±0.001 (mg/kg) in African Locust Beans to the highest mean of 82.5±0.081 (mg/kg).in African pepper

Toxic metals investigated in this study were lead, chromium and cadmium. Several acute and chronic toxic effects of trace metals affect different body systems. Gastrointestinal and kidney dysfunction, nervous system disorders, skin lesions, vascular damage, immune system dysfunction, birth defects, and cancer are examples of the complications of heavy metals' toxic effects. [57,58]. Most organisms and humans become exposed to these heavy toxic metals through the food chain, affecting various biological activities [53]. Lead poisoning causes brain malfunction in children [59], (Schneider, 2023), with signs of lead poisoning such as headaches, stomach cramps, constipation, muscle/joint pain, trouble sleeping, fatigue, irritability, and loss of sex drive [60,61]. Lead exposure can cause high blood pressure and brain, kidney and reproductive health issues in adults [60]. Lead poisoning has been reported to cause the death of more than a hundred children in a major outbreak in Zamfara state, Nigeria. 2010 [61,62].

Cadmium is a toxic trace metal that occurs naturally in an environment but can be more exposed through industrial workplaces, plant soils, and smoking. Due to its low permissible limit in humans, overexposure may occur even when trace quantities of cadmium are found. Cadmium exposure can lead to different adverse effects, including renal and hepatic dysfunction, pulmonary edema, testicular damage, osteomalacia, and damage to the adrenals and hemopoietic system [63,64]. Exposure to low levels of cadmium in air, food, water, and particularly in tobacco smoke over time may build up cadmium in the kidneys and cause kidney failure and fragile bones. Cadmium is considered a cancer-causing agent. The most important sources of airborne cadmium are smelters. Other sources of airborne cadmium include burning fossil fuels such as coal or oil and incineration of municipal waste such as plastics and nickel-cadmium batteries (which can be deposited as solid waste) [65,63]

3.1. Human Non-carcinogenic Health Risks Assessment

The non-carcinogenic health risk assessment of the plant species investigated involves establishing the Chronic Daily Intake (CDI) and Hazard Quotient (HQ) shown in Table 5.0, while the Health Index (HI) is in Table 6.0. These assessment risks [66,67,68] are mathematically computed as expressed in equations 1, 2 and 3 [68], which describe how significant the CDI risk is by the ingestion of a single trace element over a long period of time.

Table 5. Chronic daily intake (CDI), Health quotient (HQ)

Name	Zn		Cu		Fe		Cr		Cd		Pb	
	CDI	HQ	CDI	HQ	CDI	HQ	CDI	HQ	CDI	HQ	CDI	HQ
GNG	0.00047	0.0016	0.000008	0.000002	0.0027	0.0039	-	-	-	-	0.000008	0.002
GLC	0.00036	0.001.2	0.0000075	0.00019	0.0044	0.0063	-	-	0.000005	0.005	0.000013	0.003 2
BSL	0.00048	0.0016	0.000008	0.00020	0.013	0.019	0.000005	0.00167	0.000005	0.005	0.000001 3	0.003
ALB	0.00018	0.0006	0.000004	0.00010	0.00003	0.00004	-	-	-	-	-	-
AGP	0.00029	0.00097	0.000005	0.00013	0.0043	0.0062	0.000004 2	0.00138	-	-	0.000005	0.001 3
BKP	0.00005	0.00017	0.000004	0.00010	0.00038	0.00054	0.000004 2	0.00138	-	-	0.000013	0.003
AFN	0.00010	0.00033	0.000005	0.00013	0.00043	0.00061	0.000004 2	0.00138	-	-	0.00020	0.005
AFP	0.00043	0.0014	0.0000002	0.00043	0.014	0.0197	0.000002	0.0006	0.000003	0.003	0.00020	0.005
CNP	0.00010	0.00033	0.000005	0.00013	0.0017	0.0024	0.000008	0.002	0.000004	0.014	-	-
AES	0.00034	0.001 1	0.000005	0.00013	0.0013	0.001.8	0.000004	0.0014	0.000003	0.002 5	-	-

Table 6. Health quotient (HQ) and Hazard index (HI)

Name	Zn	Cu	Fe	Cr	Cd	Pb	
	HQ	HQ	HQ	HQ	HQ	HQ	HI
GNG	0.0016	0.000002	0.0039	-	-	0.002	0.0075
GLC	0.001.2	0.00019	0.0063	-	0.005	0.0032	0.0147
BSL	0.0016	0.00020	0.019	0.00167	0.005	0.003	0.0305
ALB	0.0006	0.00010	0.00004	-	-	-	0.0007
AGP	0.00097	0.00013	0.0062	0.00138	-	0.0013	0.0100
BKP	0.00017	0.00010	0.00054	0.00138	-	0.003	0.0052
AFN	0.00033	0.00013	0.00061	0.00138	-	0.005	0.0075
AFP	0.0014	0.00043	0.0197	0.0006	0.003	0.005	0.0301
CNP	0.00033	0.00013	0.0024	0.002	0.014	-	0.0189
AES	0.001 1	0.00013	0.001.8	0.0014	0.0025	-	0.0040

4. Conclusion

This study reveals the profile of the trace metals load in some commonly consumed tropical plant spices in western Nigeria, along with possible associated health risks.

Ten (10) different plant spices Ginger(Zingiberis officinate Roscoe), Garlic(Allium satvum L.), Basil(Ocinum gratissimum L.), African Locust Bean(Parkia clappertonia), Alligator pepper (Aframomum melegueta), Black pepper(Piper guineensis), African nutmeg (Monodora myristica) African pepper (Xylopia aethiopica), Cana pear (Eugelena aromatic) and Anie seed (Pimpinella anisum) were collected analyzed for potential toxic metals (K, Ca, Zn, Mg, Na, Cu, Cr, Cd, Fe and Pb) using standard digesting procedure involving Nitric and Perchloric acids in ratio 5:1. Health risk assessment indices. The range of trace metals concentration observed in the decrease order: Ca (1.08 - 236) > Mg (25.4 – 87.8) > K (2.25 – 87.0) > Fe (1.95 – 82.5) >Na (9.0 – 52.3) > Zn (.3 – 2.9) > Pb (ND – 0.13) Cu (0.03 – 0.1) Cr (ND – 0.05) > Cd (ND – 0.03) mg/kg. All trace metals investigated were observed within the allowable limits of the Food and Agricultural Organization / World Health Organization (FAO/WHO) except for Iron, which was observed to be higher than the limit of 20 mg/kg in sixteen percent (16 %) of the entire samples investigated. Estimated Daily Intakes (EDI) were all observed below the Tolerable Daily Intake (TDI). The results from this study show no carcinogenic health risk from consuming these plant spices collected in Western Nigeria, hence pointing to man's safety.

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