



Heavy Metal Concentration of Aphrodisiac Herbs Locally Sold in the South-Eastern Region of Nigeria

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Abstract: In Nigeria, Aphrodisiac herbs as well as other herbal medicines are hawked on the roadside, sold in stores and most of them are not certified by relevant Drug Agencies to be fit for human consumption. They lack manufacturing dates, Expiry dates, Batch number and any information about the chemical composition of such herbs. The buyers of such drugs patronize the black markets in their bid to give their partners maximum sexual gratification. It is no longer irregular to see sellers of such herbs moving around on foot or in vehicles in the streets marketing their various merchandize without any sort of restriction. Married men purchase these herbs to satisfy their wives and mistresses; Wives also purchase these herbs on behalf of their men; Youths who aren't married also purchase these herbs to exhibit their sexual prowess to their peers and friends. This research examined qualitatively and quantitatively the Lead and Cadmium concentrations in twelve locally sold Aphrodisiac herbs in South Eastern region of Nigeria. From the result obtained, 100% of the samples were within the lead permissible limit and 83.33% of the samples were also within the cadmium permissible limit as stipulated by the World Health Organization. It is recommended that Nigeria as well as other African countries should incorporate these herbs into the National healthcare System because there is an urgent need for quality assurance, safety and standardization of these herbs for the benefit of the consumers.

Keywords: Aphrodisiac, Heavy Metals, Lead, Cadmium, Herbal Medicine, South-East, Nigeria

1. Introduction

The emergence of westernization in Africa for many years has not been able to throw them off the custom and traditions they hold dear to themselves. Some of them still enjoy the health and satisfaction their traditional herbs provide them and teach their generations to do so because even their fathers before them sourced refuge in these herbs. It is also her tradition to satisfy their wives sexually if they do not want to lose their respect, prestige and honour in the eyes of their life partners. They envy the stories of how their ancestors were able to satisfy their wives even at hold age but in this present generation, some can't even boast of being able to fix the sexual needs of their partners once they have exceeded the age of sixty (60).

An aphrodisiac is a substance that increases sexual desire. Many foods, drinks, and behaviours have had a reputation for making sex more attainable and/or pleasurable. The name comes from Aphrodite, the Greek goddess of sexuality and

love, and substances are derived from plant, animal or mineral and since the time immemorial they have been the passion of man. Men and women alike have continued to use aphrodisiacs whether or not these drugs have any scientific basis of truly improving sexual satisfaction without regards to their composition [1]. For centuries men and women have attempted to enhance their sexual experiences with a variety of chemicals. There is a rich history in all cultures of using substances derived from plants and animals, as well as synthetic materials, to change the sexual experience. Aphrodisiac can be classified by their mode of action into three types, those that can increase libido, potency or sexual pleasure [1].

Sex-drive is a biological need or craving that inspires individuals to seek out and become receptive to sexual experiences and sexual pleasure. Chronic illness/disorder such as cardiovascular disease, diabetes, arthritis, high-blood pressure, enlarged prostates (in men), Parkinson's disease and cancer can have serious effect on biological drive and

psychological motivation for sexual desire, functioning and response of an individual [2].

Plant accumulates a number of mineral elements essential to human nutrition, though it equally accumulates other mineral elements such as Cd, Co and Ag, which are in no direct use to humans but injurious to health. Heavy metals are defined as those groups of elements that have specific weights higher than 5 g/cm³. A number of them (Co, Fe, Mn, Mo, Ni, Zn and Cu) are essential micronutrients and are required for normal growth and take part in redox reactions, electron transfers and other important metabolic processes in plants. Metals which are considered non-essential (Pb, Cd, Cr, Hg, etc.) are potentially highly toxic to plants [3].

Herbal medicines also called botanical medicines or phytomedicines, refer to herbs, herbal materials, herbal preparations, and finished herbal products that contain parts of plants or other plant materials as active ingredients. They are plant derived materials and preparations with therapeutic or other human health benefits, which contain either raw or processed ingredients from one or more plants, inorganic materials or animal origin. Herbal medicine preparations are developed and created drugs by the modern pharmaceutical industry [1, 4].

Heavy metals could pose serious health hazard to human health as these metals are not friendly to most of the major organs such as kidney, liver, renal tract, cardiovascular, reproductive and others. The uptake and bioaccumulation of heavy metals in herbs and other plants materials are influenced by a number of factors such as climate, atmospheric deposition, concentration in the soil, the nature of the soil on which the herbs are grown and the degree of maturity of the plant at the time of harvest. Long-term uses of treated or untreated wastewater, plants grown along heavy traffic ways, and previous dumpsites and other anthropogenic source of heavy metals which includes the addition of organic manures waste sludge, fertilizers and pesticides which may affect the uptake of heavy metals by modifying the physicochemical properties of the soil such as pH, organic matter and bioavailability of the heavy metals in the soil are also other factors. Farmlands near heavy traffic highways are exposed to atmospheric pollution in the form of metal containing aerosols. These aerosols can be deposited on soil and are absorbed by plants leaves, barks and fruits [2].

Globally, people develop unique indigenous healing traditions adapted and defined by their culture, beliefs and environment, which satisfied the health needs of their communities over centuries [1]. The increasing widespread use of traditional medicine has prompted the WHO to promote the integration of traditional medicine and complimentary or alternative medicine into the national health care systems of some countries and to encourage the development of national policy and regulations as essential indicators of the level of integration of such medicine within a national health care system. The plant materials include seeds, berries, roots, leaves, bark or flowers. Sexual and Reproductive health right is a fundamental human right. The

right of expression of sexual activity should have been a universal basic human right of all. This however is not obtained in all countries of the world. The level of expression of this social right is highly influenced by societal and cultural influences. Where sexual behaviour is freely expressed, such as in some Western societies, individual's sexual activities are accepted [1].

When the blame game is being played, an African man may hold the coming of the western culture (Food, Drugs, Cosmetics, e.t.c.) responsible for the reason they are unable to satisfy their spouses at old age. To some of them, the way out is to go back to the tradition of their ancestors by taking herbs to help them regain their pride in the eyes of their spouse. Due to ignorance, they do not know that Drug-Drug Interaction and Drug-Food Interaction, sometimes makes pharmaceutical drugs lose their potency. Another reason that can be linked to this infertility is the abuse of certain drugs that makes them seem like they don't function any longer.

All these and many more has led to an increase in the black market for traditional herbs that increases a person's sexual ability. In Nigeria, these herbs are hawked on the roadside, sold in stores and most of them are not certified by relevant Drug Agencies to be fit for human consumption. They lack manufacturing dates, Expiry dates, Batch number and any information about the chemical composition of such herbs. The buyers of such drugs patronize the black markets in their bid to give their partners maximum sexual gratification. It is no longer irregular to see sellers of such herbs moving around on foot or in vehicles in the streets marketing their various merchandize without any sort of restriction. Married men purchase these herbs to satisfy their wives and mistresses; Wives also purchase these herbs on behalf of their men; Youths who aren't married also purchase these herbs to exhibit their sexual prowess to their peers and friends. This is one of the reasons why there is an increase in the incidence of rape in the country.

In South Africa, Heavy metal poisoning from lead, mercury and cadmium has been repeatedly associated with traditional medicines. Between 1991 and 1995, the Johannesburg Forensic Database revealed 206 cases of death in which traditional remedies were either implicated to be the cause of death or were found to be present in cases of poisoning with unknown substances [5]. This doesn't mean traditional herbs are inefficient and poisonous but it points out the harm its deregulation and neglect by responsible government parastatals has caused.

Previous works by researchers on the determination of heavy metals on traditional herbs in Nigeria do exist, for example; Samali, *et al.* analyzed for the Heavy Metals concentration in Kano [2]; MacDonals, *et al.*, determined the Heavy metals concentration of some polyherbal products from Lagos state [6]; Umar, *et al.*, determined quantitatively for the presence of heavy metals in some commonly consumed herbal medicines in Kano state [7].

This research was embarked upon to throw light on the possible health effect as well as the quantitative determination of two heavy metals; Lead (Pb) and Cadmium

(Cd) present in Aphrodisiac herbs.

2. Materials and Methods

2.1. Sampling

The samples were collected from four different cities (Awka, Owerri, Enugu and Uturu) in South-East, Nigeria. They were purchased locally from vendors in these cities. All the herbs purchased were in liquid form meant for oral administration and were all unregistered by regulating bodies such as NAFDAC and SON. They were present in bottles that didn't have any information concerning the company such as Company's name, NAFDAC number, Batch number, Manufacturing Date, Expiry Date, e.t.c. Three samples each were bought from the different vendors in each city. The total samples analyzed were twelve in number and were labeled A1, A2, A3, O1, O2, O3, E1, E2, E3, U1, U2, and U3.

2.2. Preparation of the Samples

All the reagents used were of Analytical grade. The twelve samples were prepared for Atomic Absorption Spectroscopy (AAS) analysis. The sample was thoroughly mixed by shaking, and 100ml of it is transferred into a glass beaker of 250ml volume, to which 5ml of concentrated nitric acid is added and heated to boil till the volume was reduced to about 15-20ml, by adding conc. nitric acid in increments of 5ml till all the residue is completely dissolved. The mixture was cooled, transferred and made up to 100ml using metal free distilled water. The sample was aspirated into the oxidizing air-acetylene flame. When the aqueous sample was aspirated, the sensitivity for 1% absorption was observed [8].

The samples were then analyzed quantitatively for the presence of Lead and Cadmium using an AA240 Atomic Absorption Spectrophotometer.

3. Results

Table 1. Quantitative result of Lead in the samples.

Samples	Pb Concentrations ($\mu\text{g/g}$)
A1	0.7340
A2	0.9276
A3	0.3675
O1	0.4357
O2	0.6168
O3	0.4789
E1	0.6863
E2	0.8648
E3	0.7461
U1	0.4332
U2	0.3129
U3	0.7689

Table 2. Quantitative result of Cadmium in the samples.

Samples	Cd Concentrations ($\mu\text{g/g}$)
A1	0.1267
A2	0.3476
A3	0.0084
O1	0.0062

Samples	Cd Concentrations ($\mu\text{g/g}$)
O2	0.0048
O3	0.0087
E1	0.2116
E2	0.3127
E3	0.2455
U1	0.1042
U2	0.0766
U3	0.0932

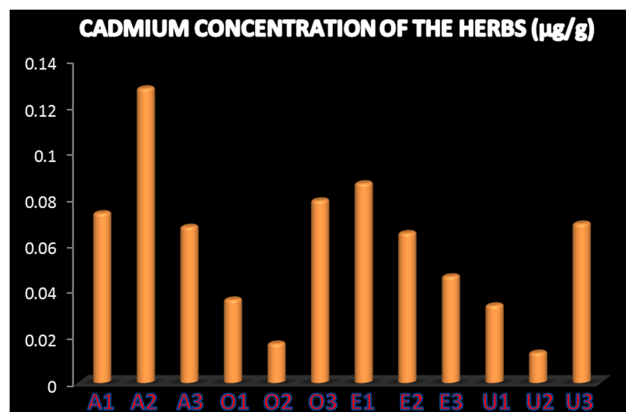


Figure 1. Graph showing the Quantitative Concentrations result of Cadmium in the samples.

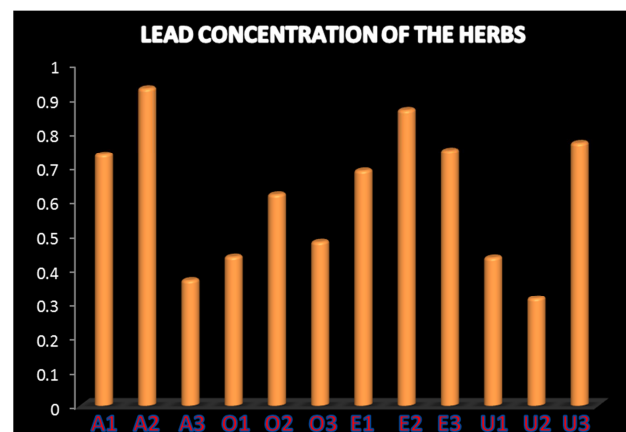


Figure 2. Graph showing the Quantitative Concentrations of Lead in the samples.

4. Discussion

Cadmium is a toxic heavy metal, well known for its occupational health risk, and cadmium (as a pollutant of air and water) is an increasing public health concern. Contamination of ground water (wells) and food are the other predominant sources of environmental pollution. Cadmium accumulates in the human body a half-life every year. Though it is recognized as a neurotoxic and nephrotoxic metal in developed countries, there is not much awareness of its toxicity in developing countries [4].

According to WHO (1998), the permissible limit of cadmium in herbal medicines is $0.3\mu\text{g/g}$ [9]. From the result obtained, all the samples were within permissible limits apart from sample A2 and E2 which had concentrations of $0.3476\mu\text{g/g}$ and $0.3127\mu\text{g/g}$ respectively. 16.67% of the

samples analyzed had their concentrations of cadmium within permissible range as stated by the World Health Organization. The value obtained is greater than that obtained by MacDonald, et al., in Lagos state [6], Umar, et al., [7]. It is less than the result obtained for cadmium determination of Medicinal Herbs by Mousavi, et al. [10], and the alarming concentrations obtained by Okem, et al., [5] and Samali, et al., [2] as high as 2.2µg/g and 3.23 µg/g respectively for the herbs analyzed in South Africa and Kano State, Nigeria.

Cadmium is known to exert toxic effects on the kidneys, the skeletal system and the respiratory system and is classified as a human carcinogen. Cadmium is known to accumulate in the human kidney for a relatively long time, from 20 to 30 years, and, at high doses, is also known to produce health effects on the respiratory system and has been associated with bone dis-ease. Cadmium has a negative effect on enzymatic systems of cells with its ability to substitute for other metal ions (mainly Zn²⁺, Cu²⁺ and Ca²⁺) in metalloenzymes and has a strong affinity for biological structures containing sulfhydryl (-SH) groups, e.g. proteins, enzymes and nucleic acids [4, 5].

Lead is a ubiquitous toxicant. Lead poisoning is an insidious disease that can result in developmental delays, behavioral disorders and irreversible brain damage. The major signs and symptoms of lead poisoning are pallor, gingival lead line, gastrointestinal disorder, and anemia, renal and neurological symptoms (peripheral neuropathy, ataxia and memory loss) in adults. Chronic exposure to lead is associated with renal dysfunction whilst, chronic lead toxicity will also lead to sterility in adults. Coincidentally, lead poisoning from traditional remedies mainly used for enhancing sexual performance has been reported and lead has adverse effects on the male reproductive system [4]. Lead (Pb) poisoning has been reported to have several clinical manifestations in the nervous, haematic, renal, gastrointestinal, cardiovascular, musculoskeletal and endocrine systems. Lead poisoning is known to elicit insidious conditions that can result in developmental delays, behavioral disorders and irreversible brain damage [5].

According to WHO (1998), the permissible limit of lead in herbal medicines is 10µg/g [9]. From the result obtained, 100% of the samples were within permissible limits as stated by WHO.

The range of concentrations obtained from the samples (0.3129-0.9276) is within range with the quantitative determination of lead in herbal plants by Ghani, et al., [10] but greater than the experimental result obtained by Umar, et al., in Kano State [7] and MacDonald, et al., in Lagos state [6]. Concentrations of lead by Samali, et al., in Kano State, Nigeria [2]; Okem, et al., in South Africa [5]; and Mousavi, et al., in Iran [10]; were reported to be as high as 35.2410µg/g, 14.910µg/g, and 52.7410µg/g.

Lead fumes and dust generated from small domestic lead scrap smelters, which are typically located within close proximity to homes, pose an exceptional health hazard to children and adults living near these operations. The neurotoxic effects of lead in experimental models has

been extensively investigated over the last two decades. Incidence of high biliary concentration of some heavy metals including Lead may be a factor in the carcinoma of the gall bladder [4]. Populations are defined as sensitive according to intrinsic (age, sex, and genetic) and extrinsic (external exposure sources) factors or a combination of the two. Thought to be the most serious diseases of the environmental and occupational origin, lead toxicity affects the most sensitive subpopulations – infants, children fetus (via maternal exposure) and pregnant women, all of whom are at risk to the subtle adverse health effects of chronic low dose lead exposure. Adolescents, especially carriers of porphyria genes are at a high risk to lead toxicity [4]. Lead is well known to inhibit the biosynthesis of heme, and consequently of hemoglobin and decrease the life span of circulating red blood cells. Iron deficiency and lead toxicity can be synergistic and potentially devastating; up to 50% more lead may be absorbed in children with iron deficiency. The developing fetus is at maximum risk of lead toxicity. Exposure of pregnant women can transfer significant amount of this metal to the developing fetus which may result in premature birth, low birth weight or even abortion. Infants born to mothers exposed to high level of lead show significant signs of neurological deficits [4].

5. Conclusion

In Nigeria, Aphrodisiac herbs as well as other herbal medicines are hawked on the roadside, sold in stores and most of them are not certified by relevant Drug Agencies to be fit for human consumption. They lack manufacturing dates, Expiry dates, Batch number and any information about the chemical composition of such herbs. The buyers of such drugs patronize the black markets in their bid to give their partners maximum sexual gratification. Two heavy metals; Lead and Cadmium were analyzed in this research qualitatively and quantitatively in twelve locally sold herbal aphrodisiacs solutions. 100% of the samples were within the lead permissible limit and 83.33% of the samples were also within the cadmium permissible limit as stipulated by the World Health Organization. Nigeria as well as other African countries should incorporate these herbs into the National healthcare System because there is an urgent need for quality assurance, safety and standardization of these herbs for the benefit of the consumers.

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