Research article

Lead Content of Three Common Suya Meats Sold on the Major Streets of Sokoto Metropolis, Nigeria

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Abstract

This study was carried out to evaluate the lead (Pb) contents of three common consumed suya meat (Beef, Chevon, and Mutton) sold on the major streets of Sokoto metropolis, in Sokoto, North Western Nigeria. The lead was determined using atomic absorption spectrophotometer (AAS) and sample selected included fresh and roasted meats at the same suya points. The results showed the presence of lead in all the tested meats. Three (3) meat samples were randomly collected from two major streets in the city of Sokoto; Abdullahi Fodio road (AFr) and Gawon Nama road (GNr). The meats were procured in two batches; one was procured fresh on arrival to the suya point at about 11:00am in each road/street (control) and the second batch after being processed at around 7:00pm (ready to eat), at the same suya points. The mean concentration and standard deviation of lead in BeefFAFr 0.070±0.005, BeefRAFr 2.10±0.10, ChevonFAFr 0.090±0.0002, ChevonRAFr 2.05±0.044, MuttonFAFr 0.06±0.006, MuttonRAFr 2.06±0.020 while in BeefFGNr 0.050±0.010, BeefRGNr 2.00±0.010, ChevonFGNr 0.080±0.008, ChevonRGNr 2.10±0.020, Mutton-FGNr 0.040±0.002, MuttonRGNr 1.75±0.080 in mg/kg respectively. Although, the concentrations observed were below limited levels, but with gradual and steady accumulation and biomagnifications of this non-biodegradable element, a risk of its rise to a lethal level with it inherent health risk could be envisaged in man in urban and peri-urban areas of Sokoto.

Keywords: Suya Meats; Lead (Pb); Bioaccumulation; Sokoto Metropolis

Introduction

Suya (Agashe/Balangu), is a spicy meat which is a popular food item in various parts of Nigeria and is enjoyed as a delicacy in West Africa. It is traditionally prepared by the Hausa people of Northern Nigeria, Cameroon, Niger, and some parts of Sudan. It is generally made from beef, ram or chickens. Innards such as kidney, liver, intestine and tripe are also used [1].

Suya is a mass consumer fast food, called a street food, because preparation and sales are often done in small stalls along local streets, sometimes under dubious hygienic conditions [2,3]. Concern have been raised about the hygienic standards of pro-

cessing and safety of roadside suya, as normally sold wrapped in old newspapers which have been criticized for serving as a possible source of contamination [4].

Cases of haemolytic anaemia have been described after ingestion of suya, possibly as a result of adulteration of food additives, as well as particulates from the atmosphere deposits on the surface of exposed meats before and after processing [5].

Most of the discharged lead from vehicles exhaust lands on the soil, in water, street fast food (including suya meat), and on living organisms. Therefore, plants are the second main dietary source of lead and meats are usually third. Consumption

of these possibly contaminated meats could cause pronounced dangers to the health, as they are prone to contamination with environmental metal pollutants [6].

Lead (Pb) has been shown to have effects on many biochemical processes in both adults and children by various authors. Anaemia has been observed in children blood at lead level (BLL) above 1.92 µmol/litre [7].The developing nervous system of a child can be affected adversely at blood lead levels of less than 10µg/dl. Children suffer neurological effects at much lower exposure levels, this cause decrease in intelligence quotient (IQ) performance and other neuropsychological defects with lead exposure [8]. Lead (Pb) exposure may lead to increased risk of hypertension and its consequences in adult, while pregnant women are at risk of spontaneous abortion and potential damage to the foetus [9]. There is a paucity of data on the lead levels of suya consumed in Sokoto, North Western Nigeria. The aim of this research work is to evaluate the lead (Pb) contents of three commonly consumed suya meats (beef, mutton, and chevon) sold on the major streets of Sokoto metropolis with a view to having baseline information on their lead (Pb) contents.The specific objectives of this study is to; determine the concentration of lead in three most commonly consumed suya meats (beef, mutton and chevon) sold on the two major streets of Sokoto metropolis, compare the lead contents in two different major streets of Sokoto metropolis (Aliyu Jodi and Gawon Nama Roads and compare the lead contents between the fresh and roasted meats sold on the two major streets of Sokoto metropolis.

Materials and Methods

Study Area

The study was conducted within Sokoto metropolis in North Western, Nigeria. Annual rainfall ranges from 500 to 750mm falling between May and September. The average temperature is about 32°C during the wet season and up to 40°C in the dry seasons [10].

Method

Three (3) meat samples were randomly collected from two major streets in the city of Sokoto; Abdullahi Fodio road (AFr) and Gawon Nama road (GNr), which include Beef, Mutton, and Chevon. The meats were procured in two batches; one was procured fresh on arrival to the suya point at about 11:00am in each road/street (control) and the second batch after being processed at around 7:00pm (ready to eat), at the same suya points. After oven dried, a known quantity was washed, wet digested and filtered. The filtrates were later analyzed for lead (Pb) using atomic absorption spectrophotometer following the standard addition method [11]. The analysis was carried out at Agric Physical Laboratory of Animal Science Department of the Usmanu Danfodiyo University Sokoto, Nigeria.

Statistical Analysis

Data collected were analyzed using statistical package for social sciences (SPSS version 20). The mean values and standard deviation were calculated. A p-value of < 0.05 was considered significant in all statistical analysis.

Results

Meats	Fresh Meat (Mean ± SD)	Roasted Meat (Mean ± SD)
Beef	0.07 ± 0.005	2.24 ± 0.100
Chevon	0.09 ± 0.002	2.50 ± 0.044
Mutton	0.06 ± 0.006	2.04 ± 0.020

Table 1. Lead (Pb) concentration (mg/Kg) in all the meats collected along Abdullahi Fodiyo road, Sokoto

Meats	Fresh Meat (Mean ± SD)	Roasted Meat (Mean ± SD)
Beef	0.05 ± 0.010	2.00 ± 0.180
Chevon	0.08 ± 0.008	2.10 ± 0.020
Mutton	0.09 ± 0.002	1.75 ± 0.080

Table 2. Lead (Pb) concentration (mg/Kg) in all the meats collected along Gawon Nama road, Sokoto

Meats	Fresh	Roasted	P-Values
BeefAFr	0.070	2.10	0.005
ChevonAFr	0.090	2.05	0.002
MuttonAFr	0.060	2.06	0.006
BeefGNr	0.050	2.00	0.01
ChevonGNr	0.080	2.10	0.008
MuttonGNr	0.040	1.75	0.002

Legend

AFr – Abdullahi Fodiyo road

GNr – Gawon Nama road

Table 3. The mean comparison between the fresh and roasted meats along Abdullahi Fodiyo and Gawon Nama roads, Sokoto

Meats	Roasted AFr	Roasted GNr	P – Values
Beef	2.10	2.00	0.100
Chevon	2.05	2.10	0.435
Mutton	2.06	1.75	0.020

Legend

AFr – Abdullahi Fodiyo road

GNr – Gawon Nama road

Table 4. The mean comparison of the roasted meats between Abdullahi Fodiyo and Gawon Nama roads, Sokoto

Discussion

This present study indicates the presence of lead, a non-biodegradable element in the suya consumed in Sokoto, North Western, Nigeria. This finding agrees with the earlier reports of Agbogidi and Egbuchua [12] that heavy metals are components of the natural ecosystems. This report is also in harmony with the finding of Zuruyk et al., [12] that various kinds of heavy metals are present in an urban environment due to mainly intense human and industrial activities.The values (0.05mg/kg) obtained from our findings from fresh beef agrees with the finding of Fathy et al., [13] who recorded 0.04mg/kg on the fresh beef meat, but inconsistent with the finding of Iweala et al., [6] who reported 0.02mg/kg obtained on roasted beef meat. The reason for the low value obtained in the previous study may be linked to the facts that the meat was not exposed to the atmosphere and not sold by the roadside. There is a significant difference (p<0.05) in levels of lead between fresh and roasted meats in all the locations. This could be from petroleum product pollution by vehicular exhausts and atmospheric particulates. But, there is no significant difference in roasted samples as the value obtained are closely related irrespective of sample location (p>0.05) except that of mutton which was significant (p=0.05). There are several reported cases of heavy metals especially lead (Pb) in Nigeria [14,15]. Although the mean amounts of lead observed in this study were within the tolerable limits of lead in foods which is 5mg/kg set by FAO and WHO [16]. This indicates that lead emitted from automobile exhausts tend to deposits and absorbed on the meats as it remains at the suya point. With gradual and steady accumulation and biomagnification of this non-biodegradable element, a rise to lethal levels with it inherent health hazards could be envisaged in man and his animals. There is a need for every suya point to have a protecting means against atmospheric particulates, following the current rise in population and industrialization in urban areas. Possible bioaccumulation of metals in the liver and kidney of man and his animals arouses a significant interest since man has the ability of bio-concentrating small doses of deleterious chemicals such that harmless quantities of poisonous chemicals would eventually build-up to a dangerous level [17].

Conclusion

The study evaluated the lead (Pb) contents of three common suya types of meat (Beef, Chevon, and Mutton) sold on the major streets of Sokoto metropolis, Nigeria. It was found out that time was taken and vehicular exhausts increase the concentration of lead in suya meats at the suya points.

Recommendations

It is hereby recommended that the meats should be masked with certain heat-resistant materials in the course of processing and selling, to ensure that this element does not to lethal levels as it is a potential health risk.

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