HEAVY METAL CONTENTS OF TOBACCO LEAVES AND SNUFF PRODUCTS FROM SOUTHEASTERN NIGERIA

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Keywords: snuff; trace metals; tobacco; toxicology; Nigeria

Introduction

Tobacco stands for any of various plants of the genus Nicotiana of the nightshade family (Solanaceae) as well as the leaves of several of these plants, which are processed for smoking, chewing or snuffing (Ali et al., 2006). *Nicotiana tabacum* is the cultivar most commonly used to make commercial tobacco products. Nicotine [3-(1-methyl-2-pyrrolidinyl)-pyridine, $C_{10}H_{14}N_2$] is a highly toxic liquid alkaloid found naturally in several plant species, including *N. tabacum*, and is the key addictive component of tobacco products. To a small extent some heavy metals enter the body through food, drinking water and air absorption. Some of these metals are essential to human body, such as Cu and Zn. However, at higher concentrations, their presence can lead to poisoning. Heavy metals are dangerous because they tend to bioacummulate in the body cells. Tobacco products including snuff has been shown to contain some heavy metals and Interest in the trace metal concentrations of tobacco products have been on the increase (Dhaware et al. 2009; Pappas et al. (2008).The objective of this study is to determine the concentrations of Fe, Zn and Cu in tobacco leaves and locally processed snuff products marketed in Imo State, southeastern Nigeria.

Methods

Sample collection: Thirty samples of tobacco leaves and thirty locally processed snuff samples marketed in some regional markets in six Local Government Areas (LGAs) of Imo State, Southeastern Nigeria were used in this study. The tobacco leaves and snuff samples were purchased from local snuff sellers in different market locations in six LGAs in Imo State in July 2008.One foreign brand of processed snuff was also purchased and investigated. On purchase, the samples were adequately labeled and transported to the laboratory. 1.0g of the sample was placed in a porcelain crucible and dry-ashed in a muffle furnace at 550°C for about 8 hours, cooled in a desiccator and then wet digested. The wet digestion was performed by adding 5ml of conc. HNO_3 (69%, BDH Laboratory Supplies, Poole, England) to each sample and heating to near dryness on a heating mantle. Where necessary, additional acid was added, and heating continued until evolution of white fumes. The solution was allowed to cool, then filtered into a calibrated flask (10ml) and made up to volume with deionized water. Blanks were inserted at 10% insertion rate. The Fe, Zn, and Cu concentrations were determined using Buck 211 Atomic Absorption Spectrophotometer.

Results

The mean metal concentrations are 843 ± 46 mg kg^{-1} for Fe, 79 ± 4 mg kg^{-1} for Zn, and 22 ± 2 mg kg^{-1} for Cu in snuff samples and; 951 ± 78 mg kg^{-1} for Fe, 83 ± 2 mg kg^{-1} for Zn, and 24 ± 2 mg kg^{-1} for Cu in tobacco leaves. Comparably, higher metal concentrations were obtained in tobacco leaves than in the snuff products, and the metal concentrations varied according to the regional markets from where they were purchased. The results of this study indicate that snuff products could constitute trace metal exposure routes to users. In the production of nasal snuffs, tobaccos are blended and milled in a high speed mill to produce very fine powder.

The Fe concentration of the only foreign brand (FB) investigated (1,961 mg kg^{-1}) was more than twice the mean Fe concentration of the locally processed snuff (843 mg kg^{-1}; range, 678-919 mg kg^{-1}). The Zn and Cu concentrations of the FB were comparable to the data obtained for the locally processed snuff products. The Zn concentration of the FB was however moderately lower (67 mg kg^{-1}) than the mean value for the locally processed snuff product (79 mg kg^{-1}; range, 67-84 mg kg^{-1}) whereas the Cu concentration of the FB was slightly higher (25 mg kg^{-1} for FB and 22 mg kg^{-1} for local snuff products). Wider variations were obtained in the Fe concentrations of both the tobacco leaves and the finished snuff products as indicated by the very wide range and high standard deviation for Fe compared to the other metals. Further analysis shows that moderate variations exists in the contents of trace metals for both tobacco leaves and snuff samples according to the regional markets sampled.

The summary of metal concentrations in the tobacco leaves presented in **Table 1**, reflects that mean concentrations of trace metals contents of tobacco leaves and snuff products were arranged in the following decreasing order: Fe>>Zn>Cu. From toxicological and environmental point of view, the determination of toxic metals in consumer products such as snuff and the raw materials has promoted interest. This is because the use of these products may be a route for human exposure to potentially toxic metals. This study shows that the use of snuff marketed in Imo State, Nigeria could constitute a significant contributor of heavy metals intake in the consumers.

Table 1. Summary of trace metal content of tobacco leaves and snuff products (mg kg^{-1})

	Tobacco leaves			Snuff		
	Fe	Zn	Cu	Fe	Zn	Cu
Minimum value	834	79.2	20.5	678	66.5	16.3
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Maximum value	1164	86.5	29.2	919	84.3	26.5
Mean	951	82.7	24.3	843	78.5	21.6
Standard deviation	77.7	1.61	2.15	46.1	3.79	2.07
Geometric mean	946	82.6	24.1	840	78.3	21.4
Median	961	82.6	24.4	843	79.0	21.5
Standard error	14.2	0.29	0.39	8.40	0.69	0.38

Conclusion

This study shows that the use of snuff marketed in Imo State, Nigeria could constitute a significant contributor of heavy metals intake in the consumers. The present work has demonstrated the need of establishing a national regulatory framework for the levels of trace metals in these products. It is hoped that these results could serve as a guide in decision making and formulation of policies on the local production/preparation and consumption of snuff.

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Proceedings of the 18th International Conference on Heavy Metals in the Environment, 12 to 15 September 2016, Ghent, Belgium