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## ASSESSMENT OF LEAD AND CADMIUM CONTENTS IN SELECTED COSMETICS PRODUCTS SOLD IN GASHU'A TOWN.

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### ABSTRACT

Samples of some commonly used cosmetic products (white powder, brown powder, lipstick, lip gloss and eye liner) were collected and analysed for their lead and cadmium contents using atomic absorption spectrophotometer after digestion. The results obtained showed the presence of lead and cadmium in all the samples, with cadmium ranging from 3.70-6.34mg/kg while lead contents ranged from 0.1-0.19mg/kg. The results also revealed that all the samples have higher concentration of cadmium when compared with the standard of 3.00 mg/kg set up for cadmium in cosmetics by FAO, with lead having concentration of less than 10.00mg/kg set up by FAO in all the samples.

**Keywords:** Cadmium, Lead, Cosmetics, Yobe.

### INTRODUCTION

For many people all over the world, the use of beauty products like soap, make-up and cream is part of their everyday life. Women, in particular love wearing makeup, as they feel it can help them enhance their beauty and make them feel and look attractive and gorgeous. Some cosmetics are, primarily, used in making the skin softer, healthier and flawless while others help in making the skin more youthful by adding texture and good health (Nnorom *et al.*, 2005).

Hepp *et al.*, 2019 posits that cosmetics are used on human body for, among other things, beautification, cleaning, increasing body attraction and appeal with little or no alteration to the body structure or functions. Different cosmetic products are intended for different purposes; the different classes of cosmetics include "skin-care creams, lotions, powders, perfumes, lipsticks, fingernail and toenail polish, eye and facial make-up, permanent waves, hair colour, hair sprays and gels, deodorants, baby oil, bath oil etc" (Hepp *et al.*, 2019).

In addition, the major components of these products are well known but the information about the trace elements is not commonly available. Even though, most of these cosmetics are made basically from mineral raw materials such as limestone, kaolin, magnesium carbonate, mica, talc, zinc oxide etc sometimes the colourant used are also made up of trace metals, for instance chromium is used in a number of products as colourant (Hepp *et al.*, 2019).

Kanias (1985) asserts that heavy metals such as lead, cadmium, mercury, aluminum and iron can be found in cosmetics as either intentional ingredients or as contaminants to constituent ingredients. Lead can be found in a range of cosmetic products such as nail color, kohl, eyeliner, whitening toothpaste and more (Hepp *et al.*, 2019).

In a study conducted by Smith and Flegal (2009), varying levels of heavy metals were found in different cosmetic products with As and Pb exceeding the recommended limits set by Canadian Authorities. Similarly, Chukwuma (1997) also established cosmetics as significant sources of lead exposure.

Lead and cadmium are elements that stirred significant interests. Their effects on the environment have been extensively studied and documented. Smith and Flegal, (1995) classified it as the most dangerous environmental pollutant since the dawn of human civilisation. Traditional eye make-up in Nigeria was also found to have significant levels of heavy metals (Nnorom *et al.*, 2005; Zauro *et al.*, 2012).

The objective of this paper was to study the imported cosmetic products used in Gashua town to ascertain their lead and cadmium concentration.

## MATERIALS AND METHODS

All the reagents used in this work were of analytical grades.

### Collection and Treatment of Samples

Facial make-ups comprising white powder, brown powder, lip-stick, lip-gloss and eye liners were purchased from retail outlet in Gashu'a central market, Gashu'a, Yobe State, Nigeria. The samples were dried at a constant weight in an oven at 80°C for 12 hours. One gram each of the dried samples was digested with HNO<sub>3</sub>, evaporated to near dryness on a hot plate and then cooled. The procedure was repeated with HClO<sub>4</sub>. More HClO<sub>4</sub> was added until the digestion was completed. The digestate was taken up in 1M HNO<sub>3</sub>, filtered with Whatman No. 44 filter paper into 100cm<sup>3</sup> volumetric flask and made up to the mark with distilled water. The filtrate was subsequently analysed for Pb and Cd using atomic absorption spectrophotometer (UNICAM, 969) at National Research Institute for Chemical Technology (NARICT) Zaria (Radojevic and Bashkin, 1999). Blank was also prepared in similar manner and analysed for the same metals.

### Statistical Analysis

Data obtained were statistically analyzed using SPSS version 10.0 statistical packages and reported as mean ± standard error of mean of triplicate values.

### Results and Discussion

Results for this analysis are reported in Table 1

The results shown on table 1 revealed that all the samples analysed contain detectable amount of lead and cadmium with values ranging from 0.1–0.19mg/kg and 3.70– 6.34mg/kg for Pb and Cd respectively. In all the samples the concentrations of cadmium are higher than that of lead. Lip-gloss has the highest concentration of lead and cadmium with mean values of 0.16 ± 0.03 and 6.22 ± 0.12mg/kg respectively, the white powder contains 0.16 ± 0.004mg/kg and 5.5 ± 0.64mg/kg of lead and cadmium respectively.

**Table 1:** Lead and Cadmium contents of different cosmetic products

Concentration (mg/kg)	Samples				
	Lip gloss	Brown powder	White powder	Lip stick	Eye liner
Pb	0.16 ± 0.03	0.14 ± 0.07	0.16 ± 0.01	0.14 ± 0.02	0.10 ± 0.02
Cd	6.22 ± 0.12	5.48 ± 0.09	5.50 ± 0.64	3.78 ± 0.08	3.92 ± 0.15

The results also showed that lead contents in all the samples were far below the recommended value of 10.0mg/kg set up by FAO in cosmetics (FAO, 2006). The level of lead in lipstick is far below the value of  $105.50 \pm 67.5$ mg/kg reported by Nnorom *et al.*, (2005) in a similar work. Parry and Eaton, (1991) and Nir *et al.* (1992) also reported higher level of Pb in some facial makeup of Morocco and Israel respectively. Lead has been known for intoxication on central nervous system, hemopoitic system and ocular system (Dwivedi, 1996), mental retardation, poor academic performance and juvenile delinquency (USEPA, 2001), there is a need for regulation of the types of cosmetics imported into the country and produced locally due to the health effects of lead, especially to young and unborn children (Lopez-Alonso *et al.*, 2000).

Excess cadmium causes a number of toxic symptoms in human; it accumulates in the kidney of mammals and cause kidney dysfunctions (Zauro *et al.*, 2012). The concentration of cadmium in all the samples is greater than the maximum level of 3.00mg/kg in cosmetics recommended by FAO (FAO, 2006). People suffering from cataract had been observed to contain high amount of cadmium in their lenses (Nnorom *et al.*, 2005). Similarly, Ophthalmologists have indicated that a seemingly disproportionately high percentage of patients with intransigent glaucoma have elevated Cd level. This could be attributed to the constant used of eye makeup (Nnorom *et al.*, 2005).

## CONCLUSION

The results of this analysis showed that different brand of cosmetics have different concentrations of lead and cadmium. The concentration of Pb in all the samples was below the limit of 1mg/kg set by FAO for

cosmetics. Whereas, Cd concentrations in all the samples was greater than 3.0mg/kg set by FAO in cosmetics. This is an indication that, the cosmetics poses a serious threat to Cd poisoning to human. Therefore, their uses should be regulated.

## REFERENCES

- Chukwuma, C., (1997): Environmental Lead Exposure in Africa. *Ambio*. 26(6):399-403
- Dwivedi, S. R., (1996): Lead Exposure Alters the Drug Metabolic Activity and The Homeostasis of Essential Metal Ions in the Lenticular System of the Rat. *Environ. Pollut.*, **94**: 61-66.
- US Environmental Protection Agency (USEPA), (2001): Residential Lead Hazard Standards- TSCA Section 403.
- Food and Drug Administration, FAO (2006): Recommended Heavy Metals Limit for Cosmetics Products. Retrieved on 29<sup>th</sup> November, 2008. Available at <<http://www.cfsan.fda.gov/~dms/cos-kohl.html>>
- Kanias, .D., (1985): Determination of Trace Elements in Eyeshadow, Face Powder and Rouge Make-up Cosmetics By Neutron Activation Analysis. *J. Radioanal. Nuclear Chem.*, **89**: 487-496
- Lopez-Alonso M., Mirinda, M., Castillo C., Hernandez, J., Garcia-Vaquero M. and Benedito, J.L. (2000): Toxic and Essential Metals in Liver, Kidney and Muscle of Pigs at Slaughter in Galicia, North-West Spain. *Food Addit. Contam.*, **24**: 943-954.
- Hepp, N.M., Mindak W.R. and Cheng, J. (2009): Determination of Total Lead in Lipstick: Development and Validation of a Microwave-assisted Digestion, Inductively Coupled Plasma-Mass Spectrometric Method. *J. Cosmet. Sci.*, **60**: 405-414.

- Nir, A., Tamil A., Zelnik N. and T.C. lancu, (1992): Is Eye Cosmetic A source of Lead Poisoning? *Isr. J. Med. Sci.*, **28**: 417-421.
- Nnorom , I.C., Igwe J.C., and Oji-Nnorom, C.G. (2005): Trace Metal Contents of Facial (Make-up) Cosmetics Commonly Used in Nigeria. *Afr. J. Biotechnol.*, **4**: 1133-1138.
- Parry, C. and Eaton, J. (1991): Kohl: A Lead-hazardous Eye Make-up from the Third World to the First World. *Environ. Health Perspect.*, **94**: 121-123
- Radojevic, M. and Bashkin V.N. (1999): Practical Environmental Analysis. Royal Society of Chemistry. Cambridge. UK.
- Smith, D.R and Flegal, A.R (1995): Lead in the Biosphere: Recent Trends. *Ambio*, **24**: 21-23
- Zauro, S.A., Umar, K.J., Umar N. and Lawal A.M. (2012): Potential Risk of Heavy Metals Poisoning Using Kohl as an Eye Make-up. Proceedings of the 35<sup>th</sup> Annual International Conference, Workshop and Exhibition of the Chemical Society of Nigeria, September 17-21, 2012, Owerri, Nigeria, pp: 185-187.