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DETECTION OF HEAVY METALS IN COSMETICS

Salve K. S.[1] and Sonwane N.S.*[2]

[1]Water Supply Dept, Z.P., Aurangabad.

*[2]Dept of Environmental Science, Vaishnavi Mahavidyalaya, Wadwani.

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***Correspondence for Author**
Dr. Sonwane N.S.
Dept of Environmental Science, Vaishnavi Mahavidyalaya, Wadwani.

ABSTRACT

Metals are commonly used in cosmetic products for blocking ultraviolet light or coloring pigments. However some metals exceed specific concentrations and can cause serious safety issues such as skin troubles and allergies. Therefore it is important to measure the exact amount of metals in cosmetic products. However the exact concentrations of metals in cosmetics that contain many organic and inorganic materials like oils, polymers, waxes, surfactants, and metallic powders are difficult to analyze due to the matrix effect. In the present investigation two different heavy metals i.e. lead and cadmium in cosmetics were analyzed using Flame Atomic Absorption Spectroscopy (FAAS). Commercial products in liquid phase were prepared for analysis and spiking solutions were added to analyze.

KEYWORDS: Cosmetics, Cadmium, FAAS, Lead.

INTRODUCTION

Last few decades have shown a big boost in cosmetic in industries. The production of the various types of the cosmetics which are needed for the care and beatification of the skin, hair, nails, teeth, body. It comprises of creams, beauty soaps, talcum and face powders, lotions, shampoos, hair oils, hair dyes, hair colors, perfumery items, lipsticks, sindoor, kajal, bindi, shaving creams, henna, rouge, body lotions, tooth paste etc. Although beauty consciousness of people has set the demand of cosmetics in the market. The side effects as well as health consciousness of people has attracted the clinicians and researchers to find out the probable reason behind their side effects. Heavy metals like lead and cadmium are common contaminant in various cosmetic products.

MATERIALS AND METHODS

Collection of Samples

Samples of the most popular brands of cosmetics were collected from the various retail shops from local market of Aurangabad. Total three different brands (coded A, B and C) of each product and total five samples of one brands of each samples were taken for study. In this way total 15 samples (5 samples for each brand A, B and C respectively) were collected for one cosmetic product. The information about test items and their quantities used in present study is summarized in table I. Five samples of different brands of each cosmetic viz. shampoo, kajal, face cream, and talcum powder were collected separately in sterilized polythene bags.

Sample preparation

Sample preparation for heavy metal analysis was done under standard procedure. Briefly 1 gm of each sample was digested in approximately 5 ml mixture of concentrated acid (HNO3 and Perchloric acid in 3:1 ratio) for 2-3 hrs on a hot plate. After this, Black or brown color is appeared then again 3.0 ml of mixture of concentrated acids is added to find out the white colored sample. The above digested samples were dissolved in 10 ml triple distilled water and filtered with the help of Whatman number 1 filter paper. The clear solution was used for metal quantification.

Heavy metals quantification

The two selective metals i.e. lead and cadmium were analyzed through atomic absorption spectrophotometer.

RESULTS AND DISCUSSIONS

Table 1: Concentration of Cadmium in different cosmetic products.

Sr. NO.	Name of the Sample	Concentration(µG/GM)
1	Brand A -Nail colour	-7.54*
2	Brand A -Kajal	0.37
3	Brand A -Moisturiser	1.05
4	Brand A -Face wash	0.07
5	brand A -Shampoo	-0.22*
6	Brand B -Soap	0.74
7	Brand B -Face wash	0.15
8	Brand B – Talkam powder	1.42
9	Brand B -Cleanser	-22.19*
10	Brand B- Lipstick	1.29
11	Brand C- Sindoor	1.65

12	Brand C-Face cream	0.37
13	Brand C- Face wash	0.67
14	Brand C- Hair dye	1.54

Table 2: Concentration of Lead in different cosmetic products.

Sr. No.	Name of the Sample	Concentration(µg/gm)
1	Brand A- Nail colour	93.23
2	Brand A- Kajal	68.75
3	Brand A- Moisturiser	43.75
4	Brand A -Face wash	24.06
5	Brand A- Shampoo	51.56
6	Brand B -Soap	30.23
7	Brand B- Face wash	40.61
8	Brand B- Talkam powder	35.02
9	Brand B -Cleanser	22.14
10	Brand B - Lipstick	129.04
11	Brand C -Sindoor	82.09
12	Brand C -Face cream	24.18
13	Brand C-Face wash	27.05
14	Brand C- Hair dye	89.06

Cosmetics are one of the most important sources of releasing heavy metals in the environment. The possibility of skin allergy/ contact dermatitis may increase due to the presence of heavy metals in cosmetics. Since the heavy metals toxicity has been exemplified the problem of environment pollution, it is necessary to know about the all possible sources. In this context, I have tested the different cosmetic products for the presence of lead and cadmium. Total three brands of each cosmetic product were taken for study. These three and more brands were categorized according to their use by different society of people e.g. brand A was mostly used by lower class society, brand B was for middle class and brand C was for higher class society.

Among the different samples analyzed, the highest concentration of lead was detected in lipstick with brand code A followed by nail color with brand code B and hair dye with brand C while face wash and white foam cleanser showed lowest lead content. In compare between same products with different brand, mostly brand A showed the highest concentration followed by brand B. Recently heavy metals like lead and cadmium were determined in lipstick using laser induced breakdown spectroscopy where they found the concentrations of lead and cadmium was beyond their safe maximum permissible limit (MPL) i.e. 0.5ppm and 1ppm respectively.

The presence of lead in cosmetics has also been reported and thus the European Union (EU) law for cosmetic banned lead and lead compounds in cosmetics since 1976, however trace amount of lead are unavoidable under conditions of good manufacturing practice.

The highest concentration of cadmium was detected in sindoor with brand code C followed by hair dye with brand C and powder brand B. face wash with brand A and B and face cream with brand C showed very trace amount of cadmium. Presence of cadmium was below detectable level in shampoo, cleanser and nail color.

Although the presence of cadmium in the samples was in less amount but the slow release of cadmium with low amount may also cause harmful effects to the human body. The presence of cadmium has also reported in various lipsticks it does not have to be present in abundance in products to produce hypertension. The small amount of cadmium is not safe. It targets blood vessel and heart tissue, as well as, the kidneys, lungs and brain, and results in heart disease, hypertension, liver damage, suppressed immune system and other nasty symptoms (www.wikipedia.org).

CONCLUSION

Heavy metal toxicity to the humans and animals is the result of long term low or high level exposure to pollutants common in our environment including in air we breathe, water, food etc. Apart from these, numerous consumer products like cosmetics and toiletries have been reported as a source of heavy metal exposure to human beings. Heavy metals like lead and cadmium were determined in different cosmetics products viz soap, face cream, shampoo, shaving cream etc from local market of Aurangabad with atomic absorption spectrophotometer. Lead was prominently detected in all of cosmetics products followed by cadmium. Among the different cosmetics products studied, the highest heavy metal contamination was found in lipstick and nail color. Present study concludes that though heavy metals are in less amount but beauty cosmetic products contaminate with heavy metals and hence may results in skin problems. The lead and cadmium detected in various cosmetics of different brands. Lead is one of most prominent toxic heavy metals in cosmetic products. The continuous use of products contaminated with such heavy metals may cause slow release of these metals into the human body and thus show their harmful effects. So the extensive uses of such products should be avoided (CAPCOA, 1993).

In cosmetics and personal care products are used repeatedly and in combination with other consumer products that can also contain hazardous chemicals. Research by government agencies, academia and independent organizations finds widespread human exposure to multiple chemicals. We are all regularly exposed to various toxic chemicals from our air, water, food and household products. People can also be exposed to the same chemical from multiple sources. Here's what you can do to protect yourself, your loved ones and future generations from unnecessary exposure to toxic chemicals in personal care products.

It does not seems good to disclose the brand names used as an samples to tell if the face makeup you are using contains heavy metals by reading the label unless you know exactly which ingredients may contain a heavy metal impurity.

Buying safer products is a great start, but we can't just shop our way out of this problem. In order for safer products to be widely available and affordable for everyone, we must pass laws that shift the entire industry to non-toxic ingredients and safer production.

REFERENCES

1. CAPCOA: California Air Pollution Control Officers Association.
2. www.wikipedia.org.