

**Determination of mercury level in skin whitening creams**

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Abstract

This study included the determination of mercury level in twelve samples of skin whitening cream available in local market in Baghdad by atomic absorption spectrophotometer ,all the samples analyzed was contained a detectable amount of mercury. The lowest concentration of mercury in the sample C (Top Shirley) was 0.482 $\mu\text{g/g}$, and the higher concentration was 29.54 $\mu\text{g/g}$ in the sample J (Norseen) .It was also noted that the samples H (whitening speckle removing day cream) and K (whitening speckle removing night cream) did not mention in the label significance the name of the country of origin and date of the validity of the product.

Key words: cosmetic products, whitening cream, mercury, atomic absorption spectrophotometer.

تحديد مستوى الزئبق في كريمات مبيض البشرة

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الخلاصة

شملت هذه الدراسة تحديد مستوى الزئبق في اثني عشر عينة من كريمات مبيض البشرة المتوافرة في الاسواق المحلية لمدينة بغداد، وتم استعمال جهاز مطياف الامتصاص الذري في تحليل النماذج، إذ لوحظ وجود تباين في نسبة الزئبق وبلغ ادنى ترميز (0.482) مايكروغرام/غم في العينة C ونوعها Top Shirley في حين كان اعلى ترميز (29.54) مايكروغرام/غم في العينة J ونوعها Norseen، وقد تجاوز بعضها النسب المسموح بها من قبل منظمات الصحة العالمية، كما لوحظ ان العينات H (Whitening speckle removing day cream) و K (Whitening speckle removing night cream) لم يذكر في بطاقة الدلالة الاعلامية لها اسم بلد المنشأ وتاريخ صلاحية المنتج.

الكلمات المفتاحية: مستحضرات التجميل، كريمات التبييض، الزئبق، جهاز الامتصاص الذري.



Introduction

The main purpose of using cosmetics are meant to improve the appearance of the skin or enhance the attractiveness of users and make their skin look more bright and shiny, not to change the basic structure of the skin. Skin lightening creams alter the chemical structure of the skin by preventing the synthesis of melanin and should therefore be regulated as drugs not cosmetics (8).

Several cosmetic products contain heavy metals such as lead, mercury, cobalt and copper as components or impurities, recently the researches has reported that these metals can easily cause many types of skin problems (10), so the use of some heavy metals in cosmetics has been controversial according to the biological increasing of those metals and their toxicity in the human body (9), for example mercury is found in skin whiteners and other cosmetics (4), and salts of this metal curb the formation of melanin, which is resulting in a lighter skin (3), and the constant use of products containing mercury can lead to inflammation of the liver, kidneys and urinary tract, so the existence of it in skin creams has become a serious global problem which is threatening public health (6).

In some studies of creams obtained in the Saudi Arabian market, mainly originating from Asia and the Middle East using Inductively Coupled-Plasma Spectrometry (ICP), mean mercury concentration was 3.76 $\mu\text{g/g}$ which was excessively higher than the USFDA permissible limit (1), and most of the common and widely used skin whitening creams found in Nepalese market contain some level of mercury ranges from below 0.025 $\mu\text{g/g}$ to 0.521 $\mu\text{g/g}$ (7), also, another studies were analyzed the mercury content of cosmetics made in Mexico, it was 1.325 $\mu\text{g/g}$ This facial cream has been produced in Mexico, although it has been stated that it is a German formulation (11). The concentration of mercury in skin lightening creams has been the subject of study in recent years and the mercury content of some creams have been reported in Ghana (15), there for the monitoring of mercury in skin whitening creams is essential for protection of the environment and of our health(14). So, this study aimed to determine the levels of mercury in various different whitening cream products that available in local markets, Baghdad ,Iraq.



Materials and Method

Collection of samples:

Samples of the most popular brands of skin whitening creams were collected from the various shops from local market of Baghdad, Iraq in 2014.

Sample preparation:

Sample preparation for heavy metal analysis was done as following (2), 1 gm of each sample was digested in approximately 5 ml mixture of concentrated acid (Nitric acid and Hydrochloric acid in 3:1 ratio) for 2-3 hour . on a hot plate at 70°C. If black or brown color is appeared then again add 3.0 ml of mixture of concentrated acids to find out the white colored sample. The above digested samples were dissolved in 10 ml deionized water and filtered by a filter paper Whatman No. 1. The clear solution was used for metal quantification.

Mercury quantification:

Mercury was analyzed by atomic absorption spectrophotometer (Dena 350AA) with hydride generation , in the Ministry of Industry, Ibn Sina laboratories, Iraq.

Results and Discussion:

(Table 1) gives a label of the 12 samples of whitening cream from various origins and shops in different locations in Baghdad, the labels definition all the samples except H and J that didn't indicate the country of origin and the validity period, and they contain mercury so the user must attention so it.



Table (1) :Label of whitening cream samples.

No.	Sample name	Country of origin	The validity period
A	Top Shirley	Taiwan	10/2013 -10/2018
B	Super Rose	Taiwan	5/2013 -5/2018
C	Top Shirley	P.R.C	2/2012 -2/2017
D	Beautiful face 92	Thailand	1/2011 -1/2016
E	Vitamin E	Thailand	12/2010 -12/2015
F	Gerovital H ₃ evolution	EU	Not mentioned - 2/2015
G	SK-II Cellumination cream EX	Japan	3/2013 -1/2018
H	Whitening speckle removing day cream	It didn't mention the country of manufacture on the label	Not mentioned
J	Norseen	Thailand	7/2013 -7/2018
K	Whitening speckle removing night cream	It didn't mention the country of manufacture on the label	Not mentioned
L	Clean and Clear	France	Not mentioned - 3/2016
I	Soft Touch Sun block and whitening cream	London-England	5/2013 -4/2016

(Figure, 1) explain a compare of the concentrations of mercury in 12 samples of whitening cream from various origins and shops in different locations in Baghdad.

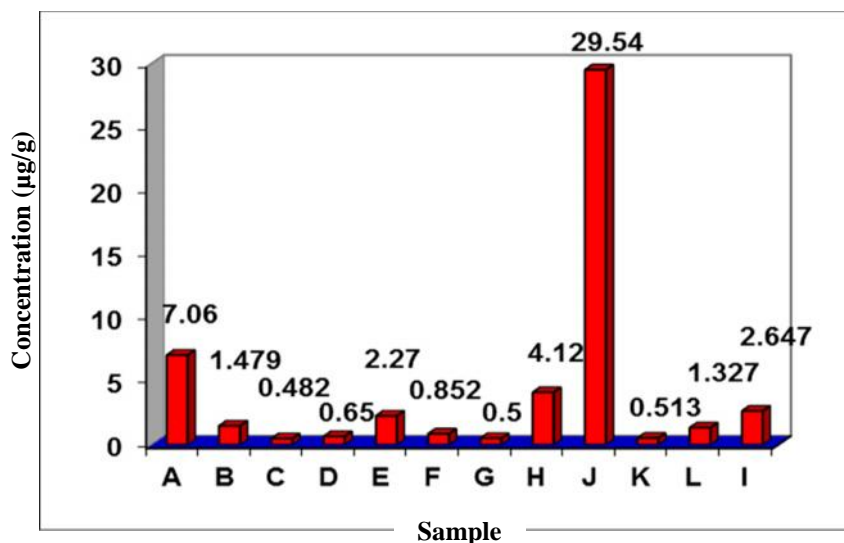


Figure (1) : Compare between difference samples in level of Hg ($\mu\text{g/g}$)

All the products contained mercury ranging from 0.482_29.54 $\mu\text{g/g}$, the highest concentration of mercury obtained in Norseen (J) was 29.54 $\mu\text{g/g}$ and the lowest concentration which in Top Shirley (C) was 0.482 $\mu\text{g/g}$.

A European Union Directive specifies that mercury compounds are not allowed as components in cosmetics products. However, phenyl mercuric salts for use as a preservative in eye makeup and eye makeup removal products are allowed at concentrations equal to or less than 0.7 $\mu\text{g/g}$ by weight (12), health Canada's draft guidance on heavy metal impurities in cosmetics specifies a limit of 3 $\mu\text{g/g}$ for mercury as an impurity in cosmetic products (5), the United States Food and Drug Administration allows mercury compounds in eye area cosmetics concentration less than 1 $\mu\text{g/g}$, but the presence of mercury must be unavoidable under good manufacturing practice (13), and many African nations have banned use mercury in skin lightening products (16), the Philippines is reported to have banned skin lightening products with mercury levels exceeding the Philippine regulatory limit of 1 $\mu\text{g/g}$ in 2011 (17).

Conclusion:

In the present study mercury was determined in various trade mark of whitening creams, from the results, the toxic metal were present in high quantities in some samples. Extensive use of such products should be avoided until the situation is adequately addressed. The lack of appropriate permissible limits for most of this element in Iraq, regular inspection and laboratory analysis of this elements content of such products on the market exposes the population to avoidable health risks. Therefore these products manufacturers must comply with standard specifications and should not be added raw materials containing mercury and its products to creams bleach, and activating the role of the regulatory and legislative government bodies that all of these products are subject to quality control tests to monitor levels this toxic element.

References

1. Al-Saleh, I. and Al-Doush, I. (1997). Mercury content in skin lightening creams and potential hazards to the health of Saudi women. *Journal Toxically Environ Health*. 51:123-130.
2. Amit, S.; Chauhan, R.; Atul, K.; Sharad, S.; Dinesh, K. and Vinayak, S. (2010). Determination of lead and cadmium in cosmetic products. *J. Chem and Pharm. Res*. 2(6): 92-97.
3. Engler, D. E. (2005). Mercury bleaching creams. *Journal of the American Academy of Dermatology*. 52(6):1113-1114.
4. Environmental Defense Canada. (2011). The Health Risks of Hidden Heavy Metals in Face Makeup. (<http://environmentaldefence.ca>).
5. Health Canada. (2009). Draft Gidance on Heavy Metal Impurities in Cosmetic. <http://www.hc-sc.gc.ca/cps-spc/legislation/consultation/-cosmet/metal-metiaux-consult-eng.php>.
6. Ladizinski, B.; Mistry, N. and Kundu, R. (2011). Wide spread use of toxic skin lightening compounds: medical and psychosocial aspects. *Dermatologic Clinics Journal*. 29: 111-123.
7. Nesterenko, P. N. and Jones, P. (1997). Single-column method of chelation ion chromatography for the analysis of trace metals in complex samples. *Journal Chromatogram. A*. 770: 129-135.
8. Olumide, Y. M. (2010). Use of skin lightening creams. *British Medical Journal*. 341: 6102-6102.



9. Ram, S. (2012). The Problem of Mercury in Skin Whitening Cream in Nepal Center for Public Health and Environmental Development(CEPHED).www.no-burn.org.
10. Regulations on The Use of Toxins in Cosmetics. (2012). <http://www.healthreport.co.uk/cosmetics-regulations.htm>.
11. Rubio, A. D.; Peregrino, C. P.; Moreno, V. M.; Miranda, V. S. and Leal, L. O. (2011). Mercury Levels in Locally Manufactured Mexican Skin Lightening Creams. Int. J. Environ. Res. Public Health 8: 2516-2523.
12. UNEP. (2008). Mercury in Products and Wastes .United Nations Environment Programmer, Geneva.
<http://www.unep.org/hazardoussubstances>.
13. USFDA. (2000). Cosmetics Ingredients Prohibited and Restricted by FDA Regulations .United States Department of Health and Human Services, Food and Drug Administration.
<http://www.fda.gov/Cosmetics/Product>.
14. USEPA. (2013). Minimata Convention on Mercury.United State of Enviromental Protection Agency.
<http://epa.gov/international/toxics/mercury/minimata.html>.
15. Voegborlo, R. B.; Agorku, S. E.; Buabeng, B. and Zogli, E. (2008). Total mercury content of skin toning creams and the potential risk to the health of women in Ghana. Journal of Science and Technology. 28: 88-94.
16. WHO. (2003). Elemental Mercury and Inorganic Mercury Compounds. World Health Organization and International Programmer on Chemical Safety. Geneva. <http://www.who.int.pdf>.
17. WHO. (2011). Mercury in Skin Lightening Products. World Health Organization. Geneva. <http://www.who.int.pdf>.