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 μg/g, and the higher concentration was 29.54 μg/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 كرمات مبيض البشرة

هي جابر حسين
الجهاز المرتب للتقييس والسيطة النوعية
وزارة التخطيط
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جامعة بغداد

الخلاصة

شملت هذه الدراسة تحديد مستوي الزئبق في ثبتين عينتين من كرمات مبيض البشرة المتواجدة في الأسواق المحلية لمدينة بغداد، وتم استخدام جهاز مطـاف الامتصاص الذرب في تحليل النماذج، إذ لوحـاً وجود تباين في نسبة الـئـب وبلغ ادنى ترـيز (0.482) في حين كان أعلى ترـيز (29.54) مايكرؤولامغم في العينة C ونوعها Top Shirley ونوعها C ونوعها }
مايكرؤولامغم في العينة J ونوعها }
مايكرؤولامغم/غم في العينة H ونوعها }
Whitening speckle (K ) و (removing day cream H ) و (removing night K )،}

الكلمات المفتاحية: مستحضرات التجميل، كرمات التبييض، الزئبق، جهاز الامتصاص الذرب.
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 μg/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 μg/g to 0.521 μg/g (7), also, another studies were analyzed the mercury content of cosmetics made in Mexico, it was 1.325 μg/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.

<table>
<thead>
<tr>
<th>No.</th>
<th>Sample name</th>
<th>Country of origin</th>
<th>The validity period</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Top Shirley</td>
<td>Taiwan</td>
<td>10/2013 - 10/2018</td>
</tr>
<tr>
<td>B</td>
<td>Super Rose</td>
<td>Taiwan</td>
<td>5/2013 - 5/2018</td>
</tr>
<tr>
<td>C</td>
<td>Top Shirley</td>
<td>P.R.C</td>
<td>2/2012 - 2/2017</td>
</tr>
<tr>
<td>E</td>
<td>Vitamin E</td>
<td>Thailand</td>
<td>12/2010 - 12/2015</td>
</tr>
<tr>
<td>F</td>
<td>Gerovital H3 evolution</td>
<td>EU</td>
<td>Not mentioned - 2/2015</td>
</tr>
<tr>
<td>G</td>
<td>SK-II Cellumination cream EX</td>
<td>Japan</td>
<td>3/2013 - 1/2018</td>
</tr>
<tr>
<td>H</td>
<td>Whitening speckle removing day cream</td>
<td>It didn’t mention the country of manufacture on the label</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>J</td>
<td>Norseen</td>
<td>Thailand</td>
<td>7/2013 - 7/2018</td>
</tr>
<tr>
<td>K</td>
<td>Whitening speckle removing night cream</td>
<td>It didn’t mention the country of manufacture on the label</td>
<td>Not mentioned</td>
</tr>
<tr>
<td>L</td>
<td>Clean and Clear</td>
<td>France</td>
<td>Not mentioned - 3/2016</td>
</tr>
</tbody>
</table>
(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 (g/g)

All the products contained mercury ranging from 0.482-29.54 g/g, the highest concentration of mercury obtained in Norseen (J) was 29.54 g/g and the lowest concentration which in Top Shirley (C) was 0.482 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 g/g by weight (12), health Canada’s draft guidance on heavy metal impurities in cosmetics specifies a limit of 3 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 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 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


