



Investigation of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids In Whitening Facial Cream

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Abstract

Whitening facial cream has become popular among Thai people as they desire having a clear skin. There were various brands of whitening facial creams sold in the market. There were harmful chemicals detected in those whitening facial creams. This study aimed to detect Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone and Steroids in whitening facial cream and to find the percentage of Mercury, Retinoic Acid (Vit A), Hydroquinone and Steroids from the samples of whitening facial cream chosen randomly examined. 18 samples of the face whitening cream products, that were sold online, were collected where each sample must be selected based on the following factors 1) indications for quick results of having a brighter face, reduce acne and blemishes 2) The price range per Gram was between 1 to 30 Baht. We use a test kit to detect mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids in cosmetics produced by Master Lab. 12 (66.67%) of the 18 prohibited chemicals were found, 5 samples were found to contain Ammoniated Mercury, 3 samples were found to contain Retinoic Acid (Vit A), 3 were found to contain Hydroquinone, and 5 were found to contain Steroids. 87% of the samples were purchased from Platform B which contained prohibited chemicals, 25% of the samples purchased from Platform A contained injurious chemicals. From the results of this study, it can be concluded that the distribution channel which does not select the quality of the product before selling it to the consumer, there is a risk of getting a product that contains dangerous chemicals.

Keywords: Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, Steroids, Whitening facial cream

Introduction

Nowadays, people of all ages and genders are paying more attention to their skin tone, especially in Thailand, where the beauty standard favors people who have got white and fair skin [1]. Many people use skin creams, face scrubs, and even intake supplements to enhance their skin [2]. As a result, this leads to the production of whitening facial cream, which meets the needs of people in modern days [3]. However, some manufacturers produce facial creams that contain prohibited chemicals for the consumers'

results to be quickly recognized. At the same time, this is detrimental to consumers in the long run [4]. There are various facial creams, including whitening creams, acne creams, makeup foundation, sunscreens, anti-wrinkle creams, and many more. Most of the compounds are composed of fruit Acids and natural extracts [5]. Also, some creams contain prohibited chemicals such as Mercury, Vitamin A Acid, Hydroquinone, and Steroids. Such substances can cause the user's facial skin allergic reactions, red rashes, permanent blemishes, alkaline skin, skin cancer, acne breakouts, thin skin, and sun sensitivity.

Whitening cream makes the user's skin brighter and fairer, whereas creams that give rapid results mostly contain Mercury, Ammonia, and Hydroquinone. These substances are forbidden to use since they could lead to skin to be thinner and more sensitive to sunlight, red rash and dark skin. Hence, long-term Mercury exposure may lead to an inflammation of the kidneys, liver, and urinary tract. Based on the testing of Mercury, Ammonia, and Hydroquinone.

Nowadays, consumers can easily buy whitening facial creams via various online channels. In addition, the whitening creams are distributed in the online media come from several domestic and international manufacturers. Therefore, researchers aim to check and detect these injurious chemicals stored in facial creams which are sold online.

Objectives

1. To detect Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone and Steroids in whitening facial creams.
2. To find the percentage of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone and Steroids from the samples of whitening facial cream chosen randomly examined.

Study Method

Sampling

Samples of facial whitening cream products that are sold online were collected where each sample must be selected based on the following factors:

1. Products must have indications that it gives rapid results of having a brighter face, reduces acne and blemishes.
2. The price range must be between 1 to 30 Baht per Gram.

Procedure

Preliminary investigation of Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids in cosmetics using the Master Lab Test Kit.[6]

1. Ammoniated Mercury

The Ammonia Mercury test kit (DMSc AmmHg Tek) is used to detect mercury in our sample creams. The mechanism works when the Ammoniated Mercury reacts with the MR chemicals and forms Ammonia gas which causes the color of the samples in the test

tube to change into a magenta color. The lowest detectable Mercury is 0.01% in the lotion sample and 0.03% in the cream sample. This test set contains an accuracy of 98.25%.

Method

1.1 Use a stick to scoop up a small amount of cream sample. Then, apply the sample around the mouth of the test tube.

1.2 Drop 10 droplets of MR into the test tube that contain samples and shake gently 30 times.

1.3 Set a timer for 1.30 minutes before checking the test results.

2. Retinoic Acid (Vit A)

Method

2.1 Wear protective gloves.

2.2 Use plastic sticks to scoop the cream samples of about the size of a bead or drop 3 droplets of lotion into the plastic well plate.

2.3 Use the given spoon to scoop about 10 pieces of test substances into the sample. Then, use the plastic stick to press the pieces of test substances into the samples.

2.4 Observe the changes in color of the test substances.

3. Hydroquinone

Method

3.1 Scoop a small amount of samples or drop 2 droplets of lotion.

3.2 Drop 2 droplets of the test solution into the sample.

3.3 Use the provided plastic stick and mix the sample together for 30 seconds.

4. Steroids

Method

4.1 Scoop one spoon of sample into the test well plate.

4.2 Drop 1 drop of STR 1 solution into the test well plate and use a plastic stick to mix the sample for 30 seconds.

4.3 Drop 1 drop of STR 2 solution into the test well plate and use a plastic stick to mix the sample for another 30 seconds.

4.4 Set a timer for 10 minutes and observe the result.

A comparative study between the detection of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids with various factors

By studying the effect of many factors of facial cream with indications “Whitening facial cream” on the detection of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids with various commercial factors studied, namely the price of product/Gram (Product/Gram 1-10 Baht/Gram 13 samples and 11-20 Baht/Gram 5 samples), identification of production information on the label (Indicates manufacturer information 12 samples and 6 samples unspecified), and places of sale (Online Shop A for 6 samples and Online Shop B for 12 samples).

Results

Based on the detection of prohibited chemicals; Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids in 18 samples of whitening facial cream, 12 out of all samples contain these injurious chemicals. This was accounted for 66%, classified according to the types of prohibited chemicals detected as follows:

1. Ammoniated Mercury in 5 samples accounted for 27%.
2. Retinoic Acid in 3 samples accounted for 16 %.
3. Hydroquinone in 3 samples accounted for 16 %.
4. Steroids in 5 samples accounted for 27 %.

In addition, the samples were applied in this experiment, 13 samples cost between 1 to 10 Baht per Gram, and 5 samples cost between 11 to 20 Baht. However, only 6 samples indicated the production sites, while the other 12 did not indicate (Table 1)

Table 1. Detection Results of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids

No.	Mercury	Vit A	Hydroquinone	Steroids	Price/Gram	Manufacturer info
Sample 1	-	+	-	-	5.14 Baht	Yes
Sample 2	-	-	-	-	1.67 Baht	No
Sample 3	+	-	-	-	8.2 Baht	Yes
Sample 4	+	+	-	-	15.8 Baht	No
Sample 5	+	-	-	+	5.375 Baht	Yes
Sample 6	+	-	-	+	12.6 Baht	No
Sample 7	+	+	-	-	5 Baht	No
Sample 8	-	-	+	-	19.5 Baht	Yes
Sample 9	-	-	+	-	19.8 Baht	Yes

No.	Mercury	Vit A	Hydroquinone	Steroids	Price/Gram	Manufacturer info
Sample 10	-	-	-	+	3.24 Baht	Yes
Sample 11	-	-	-	-	5.63 Baht	No
Sample 12	-	-	+	-	2.18 Baht	Yes
Sample 13	-	-	-	+	19.5 Baht	Yes
Sample 14	-	-	-	+	3.8 Baht	No
Sample 15	-	-	-	-	4.37 Baht	Yes
Sample 16	-	-	-	-	9.0 Baht	Yes
Sample 17	-	-	-	-	1.58 Baht	Yes
Sample 18	-	-	-	-	2.34 Baht	Yes

According to the detection results of prohibited chemicals contained in whitening facial cream which were divided by the price of 1 to 10 Baht per Gram for 13 samples, it had been found that 3 samples contained Ammoniated Mercury, 2 samples contained Retinoic Acid (Vit A), 1 sample contained Hydroquinone and 3 samples contained Steroids. 53% of whitening facial cream price range between 1-10 Baht per Gram were found to contain forbidden chemicals. For the price between 11 to 20 Baht per Gram of five samples, the result had shown that 2 samples contained Ammoniated Mercury, 1 sample contained retinoic Acid (Vit A), 2 samples contained hydroquinone, and 2 samples contained Steroids, restricted chemicals were found in every sample. The samples that illustrated manufacturer information of 12 samples, the result indicated that 2 samples contained Ammoniated Mercury, 1 sample with retinoic Acid (Vit A), 3 samples were found hydroquinone and 3 samples contained Steroids. 67%

of the samples with manufacturing information were found to contain prohibited chemicals. The samples which on manufacturer information of 6 samples, the results showed that 3 samples contained Ammoniated Mercury, 2 samples with retinoic Acid (Vit A) and 2 samples contained Steroids. 33% of the sample without manufacturer information contained prohibited chemicals. All the samples were bought from 2 online sources; Shop A and Shop B, 4 samples were bought from online shop A, 1 sample was found to contain Steroids. 25% of samples bought from shop A were found to contain restricted chemicals. While 14 samples were bought from online shop B, 4 samples were found to contain Ammoniated Mercury, 3 samples contained Retinoic Acid (Vit A), 3 samples contained Hydroquinone and 4 samples were found to contain Steroids. 87% of samples bought from shop B were found to contain forbidden chemicals. (Table 2)

Table 2. Detection results of Ammoniated Mercury, Retinoic Acid (Vit A), Hydroquinone, and Steroids compared to several factors in the samples of whitening facial cream with indications

Factors	Number	Ammonia	Vit A	Hydroq	Steroid	Total

	of Samples	ted Mercury		uinone	s	samples of chemicals found (%)
Price (Baht/Gram)						
1-10	13	3	2	1	3	53%
11-20	5	2	1	2	2	100%
Manufacturer info.						
Indicated	12	2	1	3	3	67%
Non Indicated	6	3	2	0	2	33%
Distribution Places						
Shop A	4	0	0	0	1	25%
Shop B	14	5	3	3	4	87%

Discussion

From a study of 18 samples of banned chemicals in facial creams, 12 samples were found to contain these chemicals, representing 66 % in which, Ammoniated Mercury in 5 samples accounted for 27 %, Retinoic Acid in 3 samples accounted for 16 %, Hydroquinone in 3 samples accounted for 16 %. Steroids in 5 samples accounted for 27%. These findings had shown that there were prohibited chemicals in the facial creams that available to consumers via online sales channels, which consumers can easily access to purchase. Kesorn Prasongkool and Chidchanok Ruengorn [4] conducted a study on The Analysis of the Situation on Contamination of Prohibited Harmful Substances in Facial Cosmetics in Amphur Nangrong, Buriram Province During 2013-2016 indicated that 54.55 % of the samples were found detrimental chemicals and those samples are represented wrong information in their product labels. All the samples were bought from flea market stalls and sales booths. The detection of prohibited chemicals in facial cream

were found chiefly from sources that do not have the quality recheck before being sold, such as flea markets, stalls, Store online channels. The study found that from randomly detecting restricted chemicals in cosmetics at different times, areas, and distribution channels, prohibited chemicals are still being detected, which shows that the manufacturers of whitening facial cream were still trying to smuggle these forbidden chemicals into facial creams. However, the offenses are constantly being detected.

There are many penalties when considering the legal penalties of manufacturers and distributors in the Cosmetics Act. In the conditions where the most severe penalties are manufacturer for sale, import for sale or hire to produce illegal cosmetics shall be liable to imprisonment for a term not exceeding 2 years or a fine not exceeding 200,000 Baht or both. An illegal cosmetic seller is liable to imprisonment for a term not exceeding 6 months or a fine not exceeding 50,000 Baht or both. It is expected that the legal penalties may not be severe enough for producers and distributors compared to the revenues they earn from illegal activities. Prohibited chemicals

are often detected in sales channels that have not gone through quality checks, such as some online platforms, at stalls, or flea markets, where sellers can sell products to consumers quickly. Some manufacturers may have no responsibility to consumers when they decided to add banned chemicals to speed up skin whitening quickly, resulting in consumers being exposed to the risks of forbidden substances. This was consistent with the results of studies of other factors that were expected to lead to the contamination effect of prohibited chemicals to accelerate skin whitening, which is the value of desiring to have got white skin is the mainstream of today's values. As a result, the trend of using facial cream to brighten consumers' skin is increasing so there might be some possibilities for irresponsible manufacturers to seek benefits on this issue. According to the FDA's aggressive scrutiny, it may not be as much as it should be. The FDA's website can notice this for illegal product alerts [7] that they are contaminated with the latest banned substance in 2018, which is 4 years ago. There are many penalties when considering the legal penalties of manufacturers and distributors in the Cosmetics Act [8]. In the conditions that the most severe penalties are manufacturer for sale import for sale or hire to produce illegal cosmetics shall be liable to imprisonment for a term not exceeding 2 years or a fine not exceeding 200,000 Baht or both. An illegal cosmetic seller is liable to imprisonment for a term not exceeding 6 months or a fine not exceeding 50,000 Baht or both. Nevertheless, it seems that the legal penalties may not be severe enough for producers and distributors compared to the revenue they gain from illegal activities. Therefore, whitening creams are still found to be contaminated with illegal substances.

Besides, the results of a randomized controlled trial of facial creams distributed over the Internet were also consistent with the results of the Wisitsak Wuttiadirek and Wachiraporn Pumkate [3] studies in the Study of Mercury Levels in Facial Creams Distributed in Nakhon Sawan Municipality Area was found at grocery stores, cosmetic stores, and flea markets and was consistent with a study by Kesorn Prasongkool and Chidchanok Ruengorn [4] conducted a study on The Analysis of the Situation on Contamination of Prohibited Harmful Substances in Facial Cosmetics in Nangrong District, Buriram

Province during 2013-2016. The products were randomly selected from places such as cosmetic stalls, shops or booths, flea markets, wholesale and retail outlets etc. where all the creams were found to be contaminated with restricted substances. They are all places where people can easily buy things. Products sold for sale do not need to be inspected. As a result, the products sold may not be as standard as they should have been. [8]

Limitation

This study took samples from online channels only. For this reason, the results of this study may not be conclusive, including all commercially available facial whitening creams and use a preliminary test kit to find detrimental chemicals in the facial creams. The results may contain the possibility of inaccuracies compared to standard laboratory testing.

Conclusion

12 of the 18 prohibited chemicals were found, 5 samples were found to contain Ammoniated Mercury, 3 samples were found to contain Retinoic Acid (Vit A), 3 were found to contain Hydroquinone, and 5 were found to contain Steroids 87% of the samples were purchased from Platform B which contained prohibited chemicals, 25% of the samples purchased from Platform A contained harmful chemicals. From the results of this study, it can be concluded that the distribution channel which does not select the quality of the product before selling it to the consumers, there is a risk of getting a product that contains dangerous chemicals.

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