
MERCURY AND LEAD CONTAMINATION IN SELECTED WHITENING/FAIRNESS CREAM SAMPLES FOUND IN SRI LANKA¹

by

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Abstract

Use of natural ingredients such as turmeric for beautification is an age old practice in many south Asian countries. However, application of artificial skin whitening cream has become one of the common practices in the Asian countries especially among the women. The use of imported whitening creams poses dangers to the health due to availability of high levels of mercury and hydroquinone. These health issues include cancer, skin irritation, memory loss etc. The research conducted by the Centre for Environmental Justice found very high levels of Mercury in many of the whitening creams. Sri Lanka should control these products under the Cosmetics, Devices and Drugs Act No 27 of 1980 as amended.

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1.0 INTRODUCTION

Skin whitening refers to the practice of using natural or synthetic chemical substances in order to lighten the skin tone or even the skin complexion by lessening the concentration of melanin.⁹

Mercury is one of the primary toxic metals of concern in cosmetics. The toxicity depends on the type of mercury exposed. The most hazardous form is the organic or the Methyl mercury. But all forms of mercury are absorbed through skin and tend to accumulate in the body due to lipophilic property of the chemicals.^{1,3} Contamination of mercury in blood can cause allergic reactions, skin irritation, or adverse effects on the nervous system³. Clinical symptoms of over exposure to mercury include tremors, weakness, memory loss, dermatitis and impaired kidney function⁴.

Despite of all these health issues mercury is used in whitening treatments such as whitening creams, soaps and ointments². The mercury in whitening creams function as the inhibitor of melanin formation² and the products are popular among the people with a dark complexion disregard of the gender or the country they live. Whitening cosmetic products are popular all over the world including Sri Lanka. Some survey has highlighted that some of these whitening products are available in populated as well as very rural areas of Sri Lanka.

According to the US food and Drug Administration (FDA), the concentration of mercury compounds as cosmetic ingredients is limited to eye area and not allowed to increase concentrations of mercury more than 65ppm [parts per million (0.0065 percent)] and their metal (about 100 ppm or 0.01 percent phenyl mercuric acetate or nitrate) is permitted only if no other effect. All other cosmetics containing mercury is contaminated and subject to regulatory action unless it occurs in less than 1 ppm (0.0001 percent) as metal and its presence is unavoidable under conditions of good manufacturing practice.³

There's no safe limit for Blood Lead Level. Due to their comparatively high affinity for proteins, the lead ions consumed bond with the hemoglobin (red blood pigment) and the plasma protein of the blood. This leads to inhibition of the synthesis of red blood cells and thus of the vital transport of oxygen. If the bonding capacity here is exceeded, lead passes into the bone marrow, liver and kidneys. Such intoxication leads to:

Encephalopathy in the central nervous system (CNS)

Disturbances in kidney and liver functions progressing as far as necrosis;

Damage to the reproductive organs;

Anaemia and many metabolic deficiency symptoms.

In addition, long term use of any skin whiteners can cause increase pigmentation in joints of the fingers, toes, buttocks and ears. Also the skin of the face can become thinned and the area around the eyes can have increased pigmentation leading to bleach panda effect.⁹

However, in Sri Lanka, under the SLS 743: for Skin creams and lotions, the specifications for raw materials and adjuncts are given under SLS 457: Part 2: Raw materials and adjuncts other than dyes, pigments and color additives generally not recognized as safe.⁶⁻⁸

Accordingly;

- Mercury and its compounds are listed under the Appendix A of "GNRAS" list.
- 'GNRAS" list indicates; "ingredients which are generally not recognized as safe and which shall not be permissible either in any amount or in amounts exceeding those specifically laid down for cosmetics.
- It is further elaborated in Appendix C: Part 1: The list of preservatives which cosmetic products may contain subject to the restrictions and conditions laid down. Here the description gives "Thiomersal (INN) can contain the maximum concentration of Hg remains fixed at 0.007% (70ppm), only for eye make-up and eye make-up remover.

- SLS 457: Part 2: Clause 4 indicates that “GNRAS” list shall be updated with the latest relevant WHO publications and EEC (European Economic Committee) council directives and amendments there under.
- SLS 457: Part 1: coloring agents, pigments and color additives generally recognized as safe, indicates that, silver shall confirm to be having Mercury not more than 1mg/kg.
- The maximum permissible level of Lead in pigments and color additives given under SLS457: Part 1 (coloring agents, pigments and color additives generally recognized as safe) is 20 mg/kg
- Lead and its compounds also are listed under the SLS 457: Part 2: Appendix A, “GNRAS” list of with exceptions in Appendix B.

It is always a best practice to check whether the product contains an ingredients list and mercury is not listed in it. Mercury can be indicated as, “calomel,” “mercuric,” “mercurous chloride” or “mercurio”, “mercuric oxide”, “mercuric sulphide (vermilion)”^{6,2}.

The aim of this study was to analyze the amount of Mercury in Skin whitening creams and thereby to reveal the intentional exposure to this toxic chemical just for the sake of changing the natural beauty.

2.0 METHODOLOGY

An initial survey was carried out in order to find the brands already detected for mercury in worldwide surveys. In addition a list of products was taken by the verbal conversation with users. Sampling was done for total of 16 whitening cream products from the local market stores in Colombo and Negombo where most of the customers visit.

Sample containers were cleaned and labeled with four-digit code number. 50g of each sample was collected in which some included several cream containers. This was done as a preliminary survey only to understand the contamination level. Sent for analysis to the SGS (Société Générale de Surveillance) Lanka (Pvt) Ltd and SGS India (Pvt) Ltd for testing the level of mercury and Lead using the Atomic Absorption Spectrometry (AAS). The least detection level for Mercury is 0.02ppm and for Lead 0.05 ppm.

3.0 RESULTS AND DISCUSSION

No warning label was found on the label or information leaflet. Most of the samples were imported items where language is not English (either Mandarin or Thai languages).

Mercury was detected in 25 out of 46 samples. The Sri Lanka Standard institution’s standard SLS 743 pertaining for Skin cream and lotions in its provisions for raw materials SLS 457, Part 1, lists Mercury and its compounds as a substance, which is generally not recognized as safe. But the cream samples were detected in levels between 0.06- 30167.66 ppm.

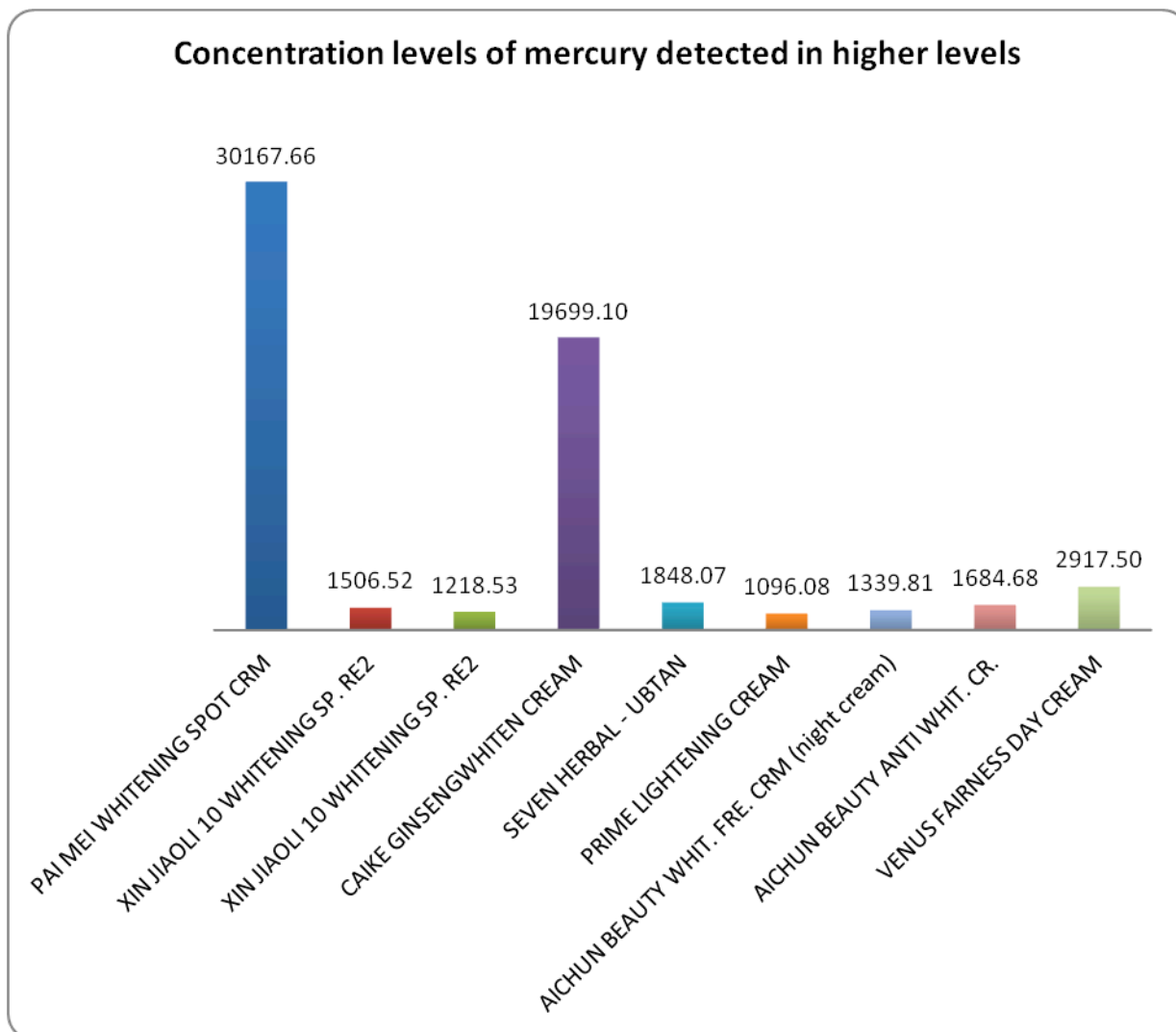


Figure 1. Concentration levels of mercury detected in higher levels.

The highest concentrations of mercury in samples ranged between 1096.08 ppm to 30167.66 ppm. According to the levels given for tolerable daily intake by the WHO (World Health Organization), the $2 \mu\text{g}/\text{kg}$ body weight/day for total mercury,⁵ all the samples contain hazardous levels of mercury in them. It is worth considering that cosmetics are not the only source of exposure. Thus it is seen that use of these products could end up with serious health effects, having in mind that whitening/fairness Cream is not the only source of Mercury exposure!

Most of these cosmetics are manufactured in China, in which the label content is indicated in Mandarin (Pai mei whitening spot cream, Xin Jiaoli 10 whitening spot cream, Caike Ginseng whitening cream, Aichen Beauty whitening freckle cream). The rest are found to be manufactured at Pakistan (Seven herbal- Ubtan), Thailand (Prime lightening cream), Hongkong (Aichen Beauty Anti spot whitening cream) and Sri Lanka (Venus fairness day cream).

Concentration of Mercury in fairness creams(Hg) ppm

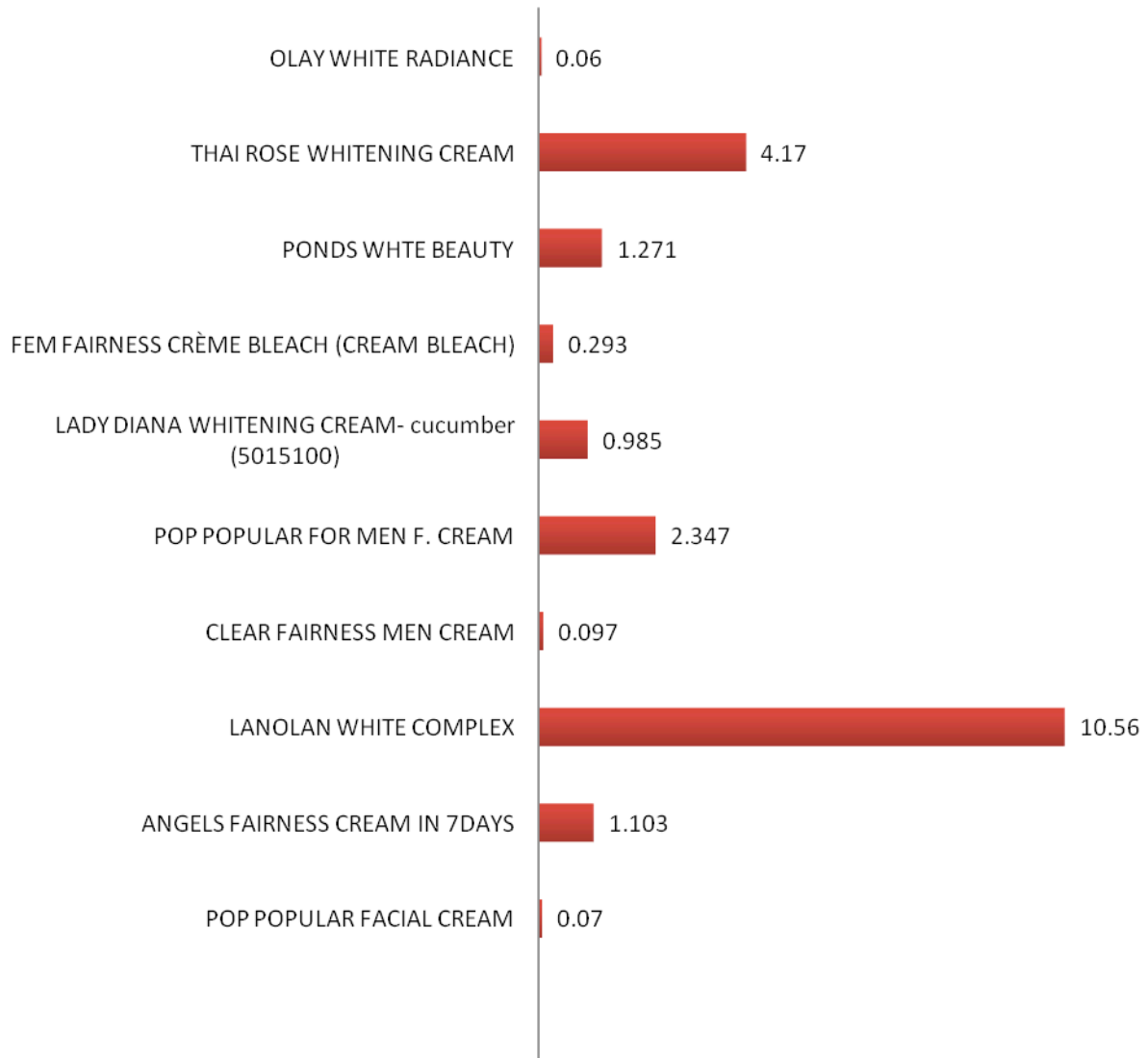


Figure 2. The concentration levels of mercury in creams tested only once

According to the SLS standard 457: Part 1, the maximum level of mercury can be contaminated in a pigment is only 1 ppm.⁷ Accordingly there are 16 out of 25 products exceeding this level. (Table 1) As for the rest, no level of mercury in a product that contact the skin cannot be indicated as safe for they are absorbed through the skin.

Concentration levels of Mercury (Hg) in other fairness creams

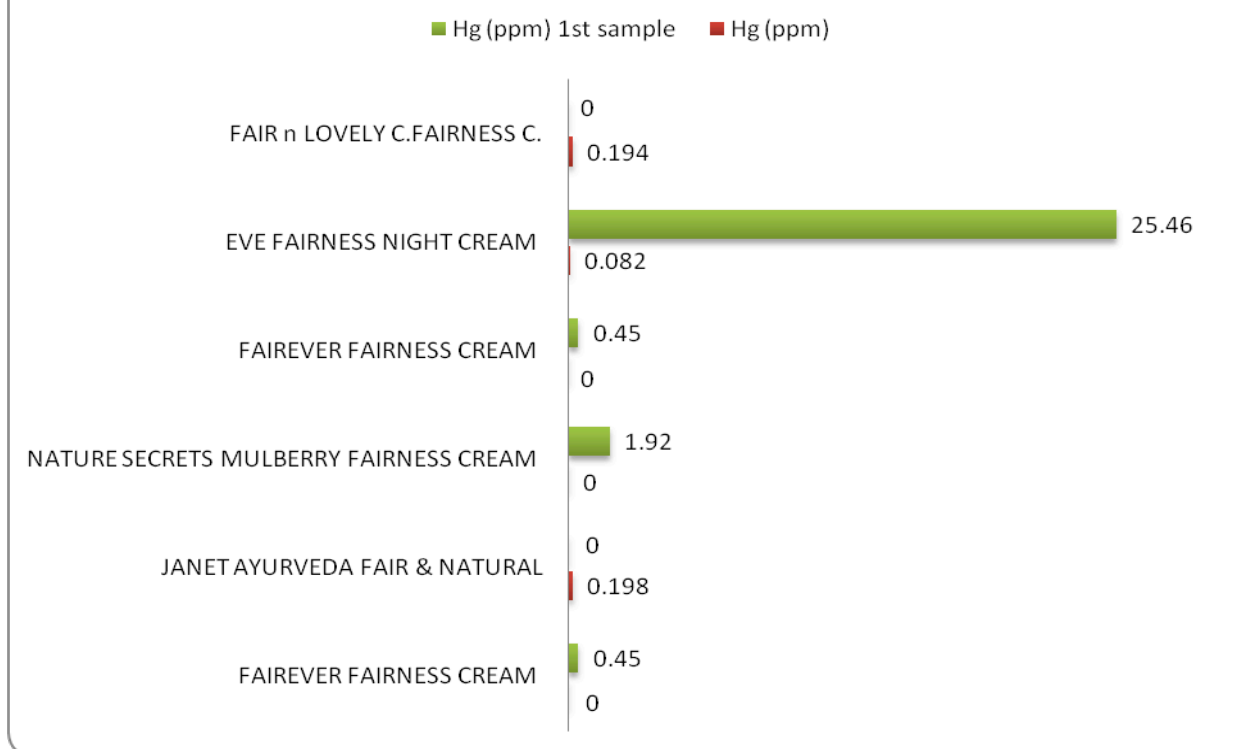


Figure 3. The concentration levels of mercury in creams tested twice

It is interesting to see that testing two samples from the market does not indicate the same result. The process of production is a batch process and gives different levels of mercury. It could be a product of the same size or different sizes. For example, when the same size containers of Janet Ayurveda Fair and natural from two batches were tested, mercury was detected only in one container. Of Nature secrets Mulberry fairness cream, one of the 35 g container was detected for mercury while 80 g container was not detected. Neither of Emami Fair and Handsome (30 g or 60 g) was detected for mercury.

Thereby it can be stated that the contamination is a batch process coming from the base material. For example the Eve fairness night cream of both 20 g containers, which was detected for 25.46 ppm and 0.08 ppm in the second sample, is not possible if this is an added ingredient. If it is an ingredient, it is not mentioned in the list of ingredients which is again violation of label standards.

Lead was detected in only one sample to a concentration of 33.27 ppm while the rest was recorded as not detected (<0.05 ppm). This is again a high level of contamination, considering the maximum permissible level of 20 ppm for coloring agents in externally applied cosmetics.

Table 1: The results indicating the detected levels for Hg and Pb. (only 16 samples were tested for lead)

	Cosmetic product	Hg (ppm) SGS Sri Lanka results	Hg (ppm) SGS India Results	Pb (ppm) SGS India results
1	XIN JIAOLI 10 WHITENING SP. RE2	-	1506.52	<0.05
2	XIN JIAOLI 10 WHITENING SP. RE2	-	1218.53	<0.05
3	CAIKE GINSENGWHITEN CREAM	-	19699.10	<0.05
4	PAI MEI WHITENING SPOT CRM	-	30167.66	<0.05
5	SEVEN HERBAL - UBTAN	1848.07	-	-
6	PRIME LIGHTENING CREAM	1096.07	-	-
7	AICHUN BEAUTY WHIT. FRE. CRM (night cream)	1339.81	-	-
8	AICHUN BEAUTY ANTI WHIT. CR.	1684.68	-	-
9	VENUS FAIRNESS DAY CREAM	2917.50	-	-
10	EVE FAIRNESS	0.08	25.46	<0.05
11	LANOLAN WHITE COMPLEX	10.56	-	-
12	THAI ROSE WHITENING CREAM	-	4.17	<0.05
13	POP POPULAR FOR MEN F. CREAM	2.35	-	-
14	OLAY WHITE RADIANCE	-	0.06	<0.05
15	POP POPULAR FACIAL CREAM	0.07	-	-
16	ANGELS FAIRNESS CREAM IN 7DAYS	1.10	-	-
17	FAIR N LOVELY C.FAIRNESS C.	0.19	<0.02	33.27
18	LADY DIANA WHITENING CREAM- cucumber (5015100)	0.98	-	-
19	FEM FAIRNESS CRÈME BLEACH	0.29	-	-
20	PONDS WHITE BEAUTY	1.27	-	-
21	FAIREVER FAIRNESS CREAM (Sample 1)	<0.01	0.45	<0.05
22	CLEAR FAIRNESS MEN CREAM	0.10	-	-
23	JANET AYURVEDA FAIR & NATURAL	0.20	<0.02	<0.05
24	NATURE SECRETS MULBERRY FAIRNESS CREAM (Sample 1)	<0.01	1.92	<0.05
25	NATURE SECRETS MULBERRY FAIRNESS CREAM (Sample 2)	<0.01	<0.02	<0.05
26	LOREAL WHITE PERFECT DAY	-	<0.02	<0.05
27	EMAMI FAIR AND HANDSOM	<0.01	<0.02	<0.05
28	DR. SASAKI WHITE N CLEAR	<0.01	-	-
29	LADY DIANA WHITENING CREAM (5075025100016)	<0.01	-	-
30	FAIREVER FAIRNESS CREAM (Sample 2)	<0.01	-	-
31	PHILIPPINO	<0.01	-	-
32	OFF MARKS	<0.01	-	-
33	4REVER TOTAL FAIRNESS CREAM BY CHANDANI BANDARA	<0.01	-	-
34	LACTO CREAM (PREVENTS SKIN DARKNING)	<0.01	-	-
35	CHANDANALEPA	<0.01	-	-
36	VASELINE HELTHY WHITE (BCD3:49) (Sample 1)	-	<0.02	<0.05
37	VASELINE HELTHY WHITE (BCD3:48) (Sample 2)	-	<0.02	<0.05
38	REVLON A.WHITENING CREAM	<0.01	-	-
39	GARNIER FAIRNESS CRM	<0.01	-	-

4.0 CONCLUSION/ RECOMENDATIONS

- It is evident that whitening cream products in the local market contains dangerous amounts of mercury. This can be varying with the sample batch and the size.
- It is necessary to bring out mandatory standards, for type of mercury and the permissible level to be included in the cosmetic product.
- There is no safe level of mercury in cosmetics. Concerning on their health hazards, license for the cosmetic products should include batch wise testing in order to confirm its safety levels not only for Mercury, but also for Lead (Pb), Cadmium (Cd), Arsenic(As), Antimony (Sb) and hydroquinone and the other toxic products possibly used in whitening creams.
- The consumer must always check for the product for the list of ingredients.

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