

'Fishy' Make-up on the Hook for Mercury Exposure: A Case Series

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ABSTRACT

Objective: This report examines the source and outcome of four Barbadian women with extremely high hair mercury concentrations (361–5617 µg/g inorganic mercury) due to topical application of mercury containing skin-lightening cosmetics.

Methods: Inorganic hair and urine mercury analysis was done at the toxicological centre laboratory of the Institut National de Santé Publique du Québec (Standard Council of Canada accredited). The clinical examinations were performed on location at the Queen Elizabeth Hospital of Barbados.

Results: Urine samples [7–135 µg/L, normal < 2 µg/L] revealed elevated mercury concentrations signifying systemic exposure. Reported symptoms during the clinical examination were consistent but nonspecific to chronic mercury exposure.

Conclusion: Evidently, cosmetics containing dangerous levels of mercury are still available for purchase in Barbados and should be entirely banned.

Keywords: Caribbean, cosmetics, mercury, skin-bleaching cream

Maquillaje 'Sospechoso' de Anzuelo para la Exposición al Mercurio: Un Estudio de Serie de Casos

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RESUMEN

Objetivo: Este reporte examina la fuente y evolución clínica de cuatro mujeres barbadenses con concentraciones de mercurio extremadamente altas (mercurio inorgánico de 361–5617 µg/g) en el pelo debido a la aplicación tópica de cosméticos para el aclaramiento de la piel, que contienen mercurio.

Métodos: Se realizó un análisis del mercurio inorgánico en el cabello y la orina, en el laboratorio del centro toxicológico del Institut National de Santé Publique du Québec (acreditado por el Consejo de Normalización de Canadá). Los exámenes clínicos fueron realizados en el Hospital Queen Elizabeth de Barbados.

Resultados: Las muestras de orina [7–135 µg/L, normal < 2 µg/L] revelaron concentraciones elevadas de mercurio, indicando una exposición sistémica. Los síntomas reportados durante el examen clínico se correspondían, aunque no de forma específica, con una exposición crónica al mercurio.

Conclusión: Evidentemente, cosméticos que contienen niveles peligrosos de mercurio se hallan todavía disponibles a la venta en Barbados, y deben ser totalmente prohibidos.

Palabras claves: Caribe, cosméticos, mercurio, crema para el blanqueamiento de la piel

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INTRODUCTION

Seafood is a well-established, primary source of organic or methylated mercury (Hg) for humans (1). As for inorganic Hg (IHg), humans are exposed predominantly from occupational undertakings (2, 3). In the medical domain, Hg has been removed from virtually all medicines but is still used in dentistry for amalgam fillings (4). Perhaps a little less suspected but just as extensive among Caribbean, Hispanic, African and Asian populations, is excessive exposure to IHg due to the application of skin-lightening cosmetics (5, 6). Generally speaking, long-term exposure to either inorganic or organic Hg can permanently damage the brain, kidneys, and developing fetus (7).

CASE REPORT

The four cases of high Hg exposure examined in this report were discovered in 2010 during a study investigating Hg body-burden in individuals working in the fishing industry of Barbados. This population is thought to be at risk of exposure due to their high consumption of fish. Total Hg was measured in the hair of 46 participants (average: 4.65 µg/g for $n = 42$). In addition, IHg was measured in the hair of four participating women who were singled-out for having exceptionally high total hair Hg (H-Hg) levels. In this report, we investigate the Hg source and outcome of the four women whose hair IHg concentrations were 77 to 1200 times the group's average. All four cases were women (age 39–54 years) of African ancestry. They had individual concentrations of: 361, 1404, 4012, and 5617 µg/g IHg in hair specimens collected from the occipital region of their scalp (US NHANES average for females 16–49 years: 0.47 ± 0.06 µg/g). Because of the possibility that such high concentrations could reflect an external contamination, we also tested for systemic Hg exposure. The analysis of spot urine samples revealed respective concentrations of 135, 64, 7, and 35 µg/L IHg adjusted for specific gravity (normal < 2 µg/L). A clinical examination was conducted on three of the women (one declined the free examination). Thorough neurological assessments including visual fields and peripheral sensation were normal, however, all three participants had nonspecific symptoms consistent with chronic exposure to mercury including fatigue, dizziness and headaches.

After investigation, we linked the source of exposure to skin bleaching cosmetics which all four women acknowledged, not without some reticence, using or having used. Mercury salts are used in some skin-lightening creams because they interrupt melanin production when absorbed by the skin (6). Two women declared using the same brand (Nadinola), manufactured in Jamaica and containing 3% ammoniated Hg listed in the ingredients, applying the product to the face and neck area twice daily.

DISCUSSION

In contrast to organic species of Hg, IHg is not well assimilated into hair during growth (8), so the extremely

elevated H-Hg levels reported here are most likely, all or in part, reflective of external contamination. Direct absorption of Hg to the hair could easily have occurred when hands covered with cream touched the hair during application to the neck area (very close to where the hair was sampled). On the other hand, Hg in urine may be a rough indicator of total IHg body burden as the Hg originates directly from Hg deposited in kidney tissue (2). Therefore, the high urinary levels reported here are most probably a result of dermal absorption, as reported in an *in vitro* study which showed significant and rapid dermal penetration of Hg after application of a complexion-lightening lotion (9).

Harmful effects to the kidneys and nervous system have been reported for urinary Hg levels in the range 20–50 µg/g creatinine-adjusted (7). Manifestation of poisoning from chronic exposure to IHg is generally insidious and non-specific. Reported symptoms include headaches, weakness, depression, dizziness, emotional disturbances, general fatigue and nephropathy (2, 10). It is important to draw attention to this problem as symptoms can be easily overlooked.

The number of female participants affected by the toxic exposure (4/20) in this study may suggest that a large proportion of the total Barbados population may be using Hg-containing cosmetics which are sold in standard pharmacies. Likewise, a recent study in New York City identified mercury-containing skin-lightening creams as the primary exposure source in nine of 13 cases among study participants with urinary levels exceeding the New York State Department of Health reportable level of 20 µg/L (11). This study highlights that despite the extensive documented harmful effects of Hg exposure and in spite of international bans, tainted cosmetics are still manufactured and available for purchase in Barbados and worldwide (5, 11, 12).

CONCLUSIONS

Mercury-containing skin-lightening creams constitute a significant source of Hg exposure to users. The women in this study were strongly encouraged to stop using these cosmetics. Doctors, clinicians and dermatologists should remain alert to the potential risk of similar exposure in patients presenting with non-specific complaints from chronic exposure to IHg; public health authorities should target resources to ban these dangerous products in the Caribbean and worldwide.

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Author's note and contribution

Written informed consent was obtained from the patients for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this Journal. We declare no competing interests. Both OD and ED acquired the data, reviewed and evaluated the patients' data regarding hair and urine mercury levels. MK performed the clinical evaluation of the patients with the advice and counsel of JR. OD was a major contributor in writing the manuscript and ED critiqued it. MK and JR read and approved the final manuscript.

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