POISON CONTROL

VOLUME 3

MERCURY POISONING IN SKIN LIGHTENING PRODUCTS (SLPS) AND CLINICAL MANAGEMENT OF CHRONIC MERCURY INTOXICATION

Skin bleaching is now so popular that on a global level skin lightening products now represent half the cosmetic industry.

These skin lightening products are used for a variety of reasons including skin bleaching, melasma, age or sun-spot reduction, morphea, dysmorphia and other medical or personal reasons. For many, the most popular reason for use of skin lightening products is to achieve a lighter skin tone.

Achieving a lighter skin tone is often driven by cosmetic desires rooted in deep historical, economic, socio-cultural, and psychosocial factors.

Skin tone is branded as beauty, grace, and high social status in many parts of the world, and this perception encourages, people, especially women to indulge in the use of skin lightening products. Usage of skin-lightening products is practiced worldwide, particularly in Arican, Asian, and Caribbean nations as well as in darker-skinned communities in Europe and North America.

A recent meta-analysis by WHO revealed a global prevalence of skin bleaching of 27.1% in Africa. In some selected African countries, the prevalence varies significantly, ranging from 25% in Mali to 77% in Nigeria, with other countries reporting intermediate rates: 32% in South Africa, 39% in Ghana, 50% in Senegal and 66% in Congo-Brazzaville. In addition, the prevalence of skin bleaching among women in Zimbabwe is 31.15%. These statistics highlight the widespread use of skin-lightening products across the continent and show the varying degrees of engagement in skin-bleaching practices in different African regions.

Skin lightening products are either applied directly on the skin (creams, soaps, powder), swallowed as tablets or capsules, or injected directly into the veins as a "drip". Most of these products contain harmful chemicals like mercury among others.

Mercury exposure in skin lightening products (SLPs)

Mercury is a common but dangerous ingredient found in skin lightening products such as creams and soaps. It is considered by World Health Organization (WHO) as one of the top ten chemicals or groups of chemicals of major public health concern.

Mercury is a naturally occurring element found in rocks, soil, water and living things. It exists in various forms: elemental (or metallic), inorganic and organic. Mercury in any form is poisonous.

The inorganic form of mercury is mostly used in skin lightening and anti-ageing products because it helps "lighten" the skin complexion, fade dark spots, remove blemishes, wrinkles, and fine lines. They are available in the form of creams, serums, masks, toners, lotions, emulsions, gels, liquids, powders, deodorants, oils, soaps and sticks. The products may be accessible at beauty supply stores, ethnic markets, and online. Consumers also purchase them in other countries and bring them back to their country.

Fig 1. These skin lightening products were found to contain mercury, hydroquinone and/or steroids

Mercury exposure associated with the use of skin lightening products may involve dermal absorption and inhalation of mercury vapours, particularly with prolonged use. Use of a product containing mercury is not only risky to the user but exposes members of the household to mercury vapour in the air. Mercury can also be spread through household items like towels or clothing materials that come in contact with the mercury containing skin products.

Toxic Health Effects of Mercury Exposure from SLPs

The inorganic mercury used in skin lightening products has various toxic effects on humans as it can easily be absorbed through the skin. There are two common forms of inorganic mercury namely; mercurous (Hg^{+}) and mercuric (Hg^{2+}) salts. These forms of mercury differ in their degree of toxicity, and have varying effects on the nervous, digestive and immune systems, as well as the lungs, kidneys, skin and eyes.

The effects of exposure are not only limited to the users, but people who are in close contact with the user may also be affected. Both the user and non-user may exhibit no symptoms or may develop mild to severe symptoms and signs.

Chronic exposure to inorganic mercury may include skin sensitization, hypertension, increased heart rate, sensitivity to light, fatigue, gastrointestinal symptoms, and

neurologic symptoms such as tremor, irritability, memory loss, and difficulty thinking. Chronic exposure to inorganic mercury may also cause renal toxicity.

Neurological and renal impairment are the most common manifestations of chronic mercury intoxication. Cardiovascular and dermatological conditions may also develop to a lesser extent.

The severity of health effects depends on different exposure factors, such as level of mercury concentration in product, product compounds affecting solubility, skin characteristics, time length of exposures and others, which also affects mercury distribution in the body.

Young children and developing fetuses are more sensitive to the adverse effects of mercury. While pregnant women who use mercurycontaining skin creams may not experience symptoms of mercury poisoning; fetuses could become poisoned, leading to brain damage and other developmental problems. It can also pass to a nursing infant through breast milk. In children, prolonged exposure to inorganic mercury may cause redness of the palms, irritability, and loss of appetite. Children poisoned by mercury may also develop neurologic, gastrointestinal, and renal problems.

It is also important to state that the U.S Environmental Protection Agency (EPA) has determined the inorganic mercury salt and organic mercury compounds as possible human carcinogens.

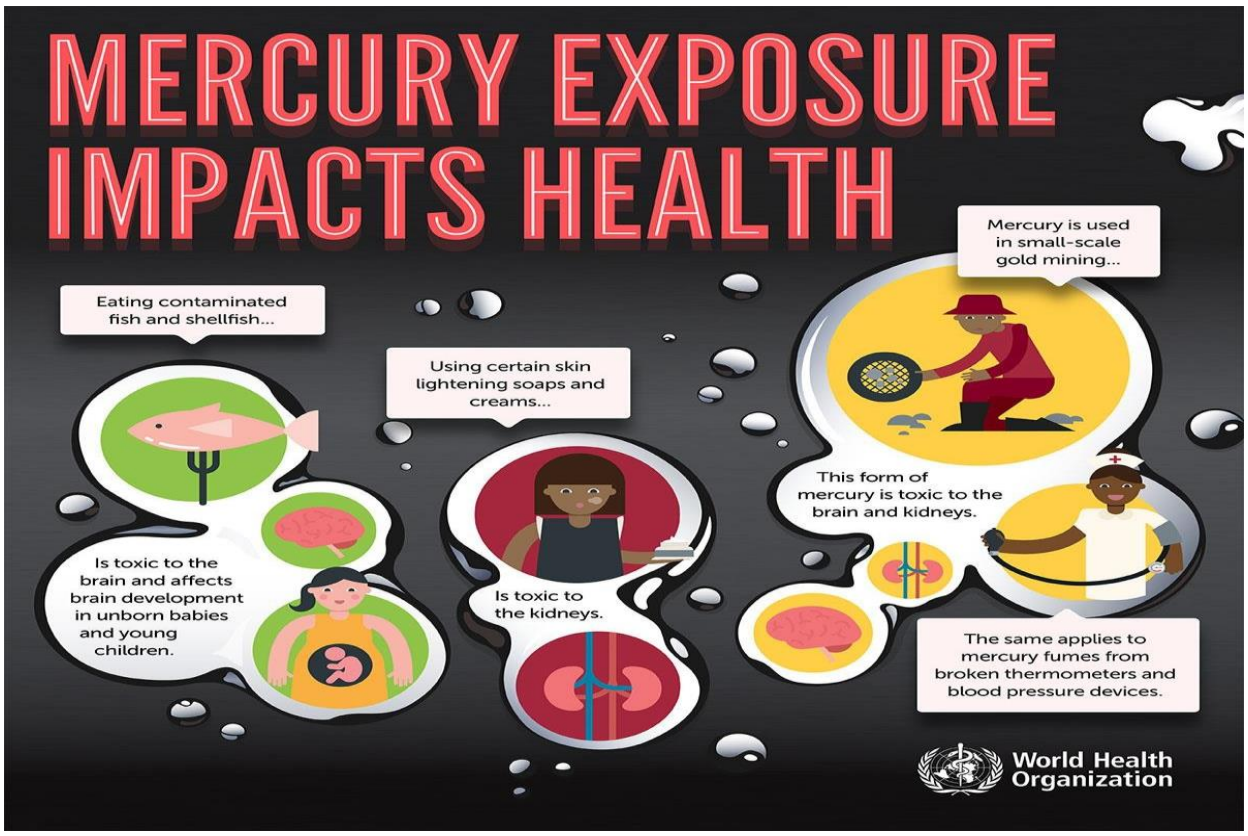

Figure 2: Skin bleaching with high mercury level SLP is one the mercury exposures which has negative impacts on health.

Regulatory Actions to Curb Mercury Exposure

The market for skin-lightening products is one of the fastest-growing beauty industries globally. According to the **International Journal of Dermatology**, demand for skin lightening products continues to grow, and the practice of skin bleaching is a serious global public health issue. The **Global Industry Analysts, Inc.**, estimated the global market for skin lightening creams as $8.8 billion in 2022 and projected it to grow to $11.8 billion by 2026.

As a result of the increasing demand for SLPs, the trade of often illegal mercury-added skin lightening products has become a global crisis and is expected to only worsen with skyrocketing demand, especially in Africa, Asia and the Middle East.

Efforts have been made by various countries to curb or eliminate mercury containing Skin Lightening Products (SLPs) inorder to reduce the risk of exposure to mercury added products. This is done through activities targeted at better regulations to reduce production, distribution, and trade within the supply chain, as well as awareness-raising and knowledge management at the global level.

At the global level, the **Minamata Convention on Mercury** is a global treaty adopted in 2013 to protect human health and the environment from the adverse effects of mercury and mercury compounds. The Convention covers all aspects of the life cycle of mercury, controlling and reducing mercury across a range of products, processes and industries. It entered into force on 16 August 2017, currently 147 countries including Nigeria have ratified the Convention. In 2013 Nigeria became a signatory to the Minamata Convention and the Article 7 of the convention highlights the need for reduction and elimination of Mercury.

Article 4 of the Minamata Convention mandates all Convention Parties to prohibit the production, import, or export of cosmetics, such as skin lightening soaps and creams, containing mercury levels surpassing 1ppm (1 mg/kg). It aims to guide countries in preventing the circulation of such products in the market. This value establishes a limit for mercury in SLPs and has already formed a basis for regulatory action by Regulatory organizations.

Figure 4: the brief about Minamata convention protecting environment and people from mercury.

Despite legislation prohibiting mercury containing products, many cosmetic products contain mercury levels higher than 1 ppm to increase whitening effect. Even in countries where distribution is banned, mercury-containing products are still easily obtainable, and their availability remains a problem.

Internet sales are a particular challenge for countries as it places a limit to regulations for online retailers. In most nations, the current legal, regulatory system fails to sufficiently safeguard consumers against dangerous, counterfeit, and illegal products marketed on the internet. One of the main reasons for this failure is that many nations' national laws allow online platforms to avoid responsibility for the products offered on their sites.

Symptoms, Diagnosis and Clinical Management of Mercury Intoxication

Mercury comes in different forms and can affect multiple body systems; therefore symptoms of intoxication can vary widely. Signs and symptoms associated with mercury poisoning are also non-specific in nature, cases may go undiagnosed for weeks or months, and misdiagnosis has led to clinical treatments that did not address the underlying poisoning.

Some of these symptoms may include;

General Signs and Symptoms	**Children with prolonged exposure**
• Difficulty concentrating, memory loss • Nervousness, irritability, anxiety • Depression, insomnia • Headaches • Weight loss, fatigue	• Pink hands and feet • Desquamation of the skin • Excessive salivation or thirst, gingivitis • Irritability, anorexia • Poor muscle tone, leg cramps • Hypertension, rash
Neuromuscular Effects	**Renal Effects**
• Tremors, paresthesias • Numbness or tingling in hands, feet, or around the lips • Weakness in the extremities	• Proteinuria • Nephrotic syndrome • Renal tubular acidosis

Diagnosis

The diagnostic process may begin with a doctor's review of symptoms, physical examination, and information gathering (on past medical history, the time, type, and mode of mercury exposure). To confirm the diagnosis, several tests to monitor mercury levels in the body will be conducted. Test to be conducted include:

- Chest X-ray.
- Urinalysis (24-hour urine collection).
- Hair test (for long-term exposure)
- Bloodwork (complete blood count and a metabolic panel).
- Electrocardiogram.

The most accurate method to confirm exposure to inorganic mercury is a urine test. A first morning void has up to an 85% correlation with a 24-hour collection, which is the most accurate test.

Renal function tests, including a urinalysis, creatinine, BUN, urine microglobulin, and microalbuminuria, should be performed in individuals with elevated urine mercury levels.

Blood mercury levels are not accurate indicators of inorganic mercury exposure. Total mercury in blood is normally less than 6 µg/L. Elevated blood mercury levels should be followed up with urine tests as described above.

However, in patients with mercury urine levels > 5 µg/g creatinine, testing for urinary mercury should be repeated every couple of months to confirm that levels are declining until the urine level is below 5 µg/g creatinine.

Treatment

The first step for treatment requires identifying the source of mercury exposure and removing it. Depending on the level of mercury poisoning, treatment may involve decontamination. Patients may be placed on an IV or given oxygen.

People with high levels of mercury poisoning in the blood may also be prescribed chelation therapy. Chelation therapy is a medical procedure that involves using chemicals or medications to remove heavy metals and other substances from the body.

A chelating agent can be injected directly into the bloodstream through an IV (intravenous drip) or given as a pill by mouth. The chelating agent binds to mercury and other toxins and exits the body through urination. Dialysis may also be recommended where kidney damage is involved.

Neurological effects due to long term exposure may need continuous treatment to manage effects.

There is no cure for mercury poisoning. However, mild to moderate symptoms may resolve over a period of months without therapy but, the best way to treat mercury poisoning is to limit exposure to the metal.

Conclusion

The use of mercury in skin lightening products is illegal and banned in most countries including Nigeria. It is important for anyone who uses skin lightening products to understand the potential harm as they may contain mercury and other harmful ingredients.

Consumers are encouraged to check product labels when purchasing SLPs, to know if it contains mercury. Skin lightening products containing ingredients such as **mercurous chloride**, **calomel**, **mercuric**, **mercurio**, or **Hg** should be avoided. Also, some illegal skin lightening products containing mercury may not include mercury in the list of ingredients on the label. Avoid products with handmade labels, labels in languages other than English, or no label at all. Products like these are in violation of NAFDAC regulations and may be harmful.

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