Blood Lead Level Screening among Beauticians in Kathmandu: A Pilot Study

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Abstract

Lead exposure from cosmetics is a growing public health concern, especially for beauticians who handle such products daily. In Nepal, weak regulatory oversight allows the circulation of counterfeit cosmetics containing high lead levels. This pilot study assessed blood lead levels (BLLs) among beauticians attending a health camp organized by the Cosmetics Society.

Forty-five beauticians with at least one year of experience participated. Blood samples were analyzed using anodic stripping voltammetry (detection limit: 3.3 µg/dL). Seven participants (20%) had elevated BLLs above this threshold, ranging from 3.5 to 16.0 µg/dL.

Findings suggest that beauticians are at occupational risk of lead exposure. Regular BLL screening, improved hygiene practices and stricter regulation of cosmetic products are recommended. Larger studies analyzing other toxic elements are warranted to better understand exposure risks in this group.

Keywords: Blood lead level; Cosmetics; Lead toxicity

Introduction

Today, working as a beautician has become a highly favored and widespread profession, with an increasing number of women choosing this career. Additionally, many women frequently visit beauty salons for various appealing services, including facials, skin care treatments, hair coloring, and other beauty-related services. To offer these treatments, a range of cosmetics and hygiene products are utilized, such as creams, deodorizing sprays, bleaching agents, hair sprays and gels, mascara, perfumes, colognes, shampoos, detergents, lipsticks, lotions, cleansers, and oil. However, these chemicals have the potential to be sources of lead poisoning.

Lead has been used as an ingredient in eyelid cosmetics, such as kohl (gazal), for centuries.1 The presence of lead in other cosmetic products has raised significant concerns, particularly in countries where regulatory frameworks are either absent or not rigorously enforced. In contrast, developed nations have established stringent policies that are diligently followed, ensuring strict monitoring of lead content in cosmetics. However, in Nepal, a report has revealed alarmingly high levels of lead in various brands of lipsticks, hair dyes, and other cosmetic products.

These products, whether imported into Nepal or manufactured domestically, are often counterfeit and falsely labeled with the names of well-known international brands. This issue persists due to the lack of accountability for authorized suppliers and registered manufacturers within the country.

Several inorganic and organic lead compounds being adulterated in these consumers product are toxic to health, including lead acetate, lead carbonate, lead chromates, lead oxide, lead sulfide, lead tetroxide, and tetraethyl lead. These compounds can cause spasms in the capillaries and arterioles, and can bind to tissues such as the brain and bones. Lead compounds may also inhibit sulfhydryl enzymes, disrupting their function. Additionally, lead can interfere with heme synthesis, leading to anemia, hemolysis, and the release of immature red blood cells. In the central nervous system, lead can damage nerve cells and myelin sheaths, causing cerebral edema. Lead toxicity also affects the kidneys, leading to nephritis, and can impair reproductive health, potentially causing infertility.

Lead exposure remains a critical public health issue due to its toxic effects, even at low levels. Beauticians, frequently exposed to cosmetics and beauty products potentially containing lead, are at an increased risk. To the best of our knowledge, there has been no comprehensive study in Nepal investigating lead levels in beauticians, despite the fact that many beauty products contain high levels of lead. This pilot study aims to address this gap by examining lead exposure among beauticians in the region.

Methods

This pilot study was conducted during a health camp organized by the Cosmetics Society. Beauticians attending the camp were invited to participate. Inclusion criteria included working as a beautician for at least one year and regular use of cosmetics.Blood samples were collected from each participant using standard venipuncture techniques. The samples were analyzed for lead content using anodic stripping voltametry (Meridian Bioscience). A blood lead level (BLL) above 3.3 µg/dL was considered the threshold for elevated blood lead levels.

Results

Participant Characteristics:

A total of 45 beauticians participated in the study. The average age was 32 years, with a range from 22 to 45 years. The average duration of employment in the beauty industry was 3.2 years.

Blood Lead Levels:

There were seven participants (20%) having detectable BLLs exceeding the 3.3 µg/dL threshold. The maximum detectable BLL was 16.0 µg/dL and minimum was 3.5 µg/dL.

Discussion

Our findings suggest that, Nepalese beautician are at risk due to exposure to lead-containing cosmetics. Hand washing appears to effectively remove lead from the hands, thereby preventing oral ingestion of lead present in cosmetics. Implementing safer working practices could further reduce or eliminate detectable blood lead levels among beauticians. It is important to note that this pilot study was intended as a screening exercise and did not investigate associations with other factors known to elevate blood lead levels. Nevertheless, the findings underscore the importance of regular BLL screening for beauticians and stricter regulation of lead content in cosmetic products.

It is important to recognize that cosmetics are not only adulterated with lead but also contain other heavy metals, such as cadmium, arsenic, and chromium. A study conducted among beauticians in Iran demonstrated that the urinary levels of potentially toxic elements were significantly higher in women occupationally exposed to cosmetics compared to a control group.3 In our study, we analyzed only the lead levels; therefore, it is crucial that future research on occupationally exposed individuals consider the analysis of additional toxic elements.

In the present study, we employed anodic stripping voltametry for the detection of blood lead levels, which has a lower limit of detection of 3.3 µg/dL. As a result, we were unable to calculate the mean blood lead level for the participants, representing a limitation of our study. Additionally, we did not collect cosmetic products used by the beauticians for lead level analysis, despite the known high lead content in cosmetics available in Nepal. It is important to note that this study was intended as a screening exercise.

Conclusion

This pilot study highlights the occupational risk of lead exposure among beauticians. Regular health monitoring and stricter cosmetic regulations are recommended to mitigate this risk. Further large-scale studies are warranted to confirm these findings and develop comprehensive occupational health guidelines.

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