

LEAD POISONING AND USE OF COSMETIC PRODUCT: KOHL

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ABSTRACT

Introduction

Determination of lead in blood is of major interest to control workplace or environmental exposure to this element. We report nineteen environmental cases of lead poisoning and 111 environmental cases of lead impregnation in a study of screening for childhood lead poisoning in the region of Fez, Morocco. Moreover, professional and environmental sources can be multiple, so it is recommended to search all sources of exposure and among them the use of traditional cosmetics such as kohl. Lead was used by all study population; it was assessed in product cosmetics such as kohl.

Methods

Ten samples of Moroccans kohl were taken from family of patients. Lead was determined in kohl samples by inductively coupled plasma mass spectrometry (ICP-MS). An analytical protocol for accurate and precise determination of lead composition was developed. Samples of lead were measured after 24 h incubation with a 4% acetic solution.

Results

Many samples were composed of lead. For 10 samples of kohl analyzed, 2 contained more than 90% and 5 contained more than 70%.

Conclusions

Many samples of kohl were full of lead. It may be a potential cause of childhood lead poisoning or lead impregnation among our study population.

KEYWORDS: Kohl, Surma, Lead, Poisoning, Cosmetic Product

INTRODUCTION

Lead is a pervasive chemical that is well known for its toxicity (Bellinger 2008). It causes neurological, physiological and behavioral problems in children, ranging from raised hearing threshold and decrease in intelligence

quotient (IQ) at low blood lead concentrations to acute encephalopathy, memory loss and death at high blood lead concentrations (Canfield et al. 2003; Surkan et al. 2007; Liu et al. 2013). Therefore the determination of lead in blood is of major interest to control workplace or environmental exposure to this element.

We report nineteen environmental cases of lead poisoning and 111 cases of lead impregnation in a study of screening for childhood lead poisoning in the region of Fez, Morocco (Bouftini 2012). Sources of lead in the environment that have been shown to contribute greatly to elevated blood lead concentrations include petrol, paint, water, food and lead-glazed ceramics. However, there is another possible source of lead in adults and children, related to the regular use of some traditional cosmetics such as kohl.

Kohl (or surma) is a lead-containing available as a fine powder or heavy crystals of lead sulfide; the color varies from shiny deep black to dull grey brown. Kohl is a widely used traditional cosmetic in Morocco and in other countries in the Middle East. The use of kohl as eyeliner is a popular practice in Morocco and people firmly believe that it is safe to use. It is mainly worn around the eyes to many infants in Morocco. An analytical study found that the concentration of lead in different types of kohl available in Morocco ranged from 74.70% to 90% (Sainte et al. 2010).

As part of our continuing study, the kohl samples were analyzed with the aim of determining their lead content and to know whether the use of kohl is it responsible for the impregnation of children's. Another aim of this study was to warn public that kohl may contain lead, and that children who may have been exposed to such kohl may suffer from lead poisoning.

MATERIAL AND METHODS

A population of 150 children, 19 was intoxicated and 111 were impregnated. Moreover, kohl is used by all study population; so it is recommended to verify the lead content of all samples used kohl.

All samples of kohl used by mothers of children's and made or purchased in Morocco, were collected in order to collect samples all types of kohl available in Fez city of Morocco. But only 10 kohl samples were taken for analysis; those obtained represented all the kohls available in the Moroccan market.

Questionnaires were used to obtain information about kohl use in study population, and the sources of different kohl preparation. Kohl was obtained in its natural form and processed into powder, form in black, grey and brown, it was also available in natural unprocessed form as pieces of galena, or lead sulfide.

The total lead content in each of the samples was analyzed using the technique of inductively coupled plasma mass spectrometry (ICP-MS). This technique requires mineralization in acidic medium (aqua regia for total lead and 0.15 N HCl for acid-soluble).

RESULTS

Questionnaire has shown that kohl is used by all children and moms, and different samples were prepared or buy locally in Morocco.

Of the 10 samples tested, 5 were lead-based and were black, grey-black, black or grey in color. It's contained in excess of 70% lead, 2 contained more than 90% lead, 1 contained 6.32 %, and the remaining 2 contained less than 3.4 % lead. (See Table 1). Two of these kohls that contain more than 98% of lead are rock of galena and another sample prepared

in the same rock. They are manufactured at home by moms. Five samples with lead more than 70% level were all purchased of fez city of Morocco. Of the five samples purchased by moms in Fez City, all four contained lead, including sample 10, which was labeled as especially formulated for use on babies. Three of these kohls transformed in the form of greasy have an unknown origin. None of the samples had labeling that indicated a list of ingredients or lead content. Without laboratory analysis, it is impossible for the consumer to differentiate high-lead from low lead content when purchasing this product.

Table 1: Lead Content of Kohl Samples Used by the Study Population

Sample	Texture	Color	Origin	Lead %
1	Rock Galena	Metallic Grey	Preparing at home	98
2	Powder	Metallic Grey	Preparing at home	91
3	Powder	Grey	Purchased of Morocco	78
4	Powder	Grey-Black	Purchased of Morocco	85
5	Powder	Grey-Black	Purchased of Morocco	83.1
6	Powder	Grey-Black	Purchased of Morocco	72.6
7	Powder	Black	Purchased of Morocco	85.3
8	Greasy	Black	Purchased of Morocco	6.32
9	Greasy	Brown	Purchased of Morocco	3.4
10	Greasy	Black	purchased of Morocco	1.02

DISCUSSIONS

Kohl is a deeply held tradition and a culturally and religiously legitimized practice among Moroccan and Arabian people. In most cases, it is prepared at home or sold in the market in an uncontrolled way.

This study found high concentrations of lead in most samples of kohl used by study population (moms and children), which can be explained by the lead poisoning or impregnation of regular kohl users. Although, several studies have reported cases of poisoning or impregnation lead to the use of the cosmetic product: kohl. (Al-Ashban et al. 2004; De Caluwé et al. 2009).

Kohl or surma appears to be a substance that may be a source of lead exposure among children and adult. For child's it can be used for eyes and/or umbilicus at birth, this application was found to be one of the causes of elevated blood lead levels in Saudi Arabian schoolgirls (Al-Saleh et al., 1999).

Given that, the lead poisoning is caused primarily by lead digestion, the regular use of kohl can also be a significant source, especially for our subject's children. Because for lead containing kohl, can be easily ingested by these infants who may wipe their eyes and face and subsequently lick their fingers, or also, during pregnancy and lactation, mobilization of lead from maternal bone is a cause for concern. A report has demonstrated that lead crosses the placenta and the cord blood lead levels correlate with maternal blood lead levels (Goyer, 1990).

Laboratory confirmation of the lead content in some Moroccan kohl already exists (Sainte et al. 2010). In addition, our laboratory analysis of samples indicates wide variations in the lead content in kohl and no way of protecting the consumer from those that are hazardous. In view of the above mentioned toxic effects and the widespread use of kohl, children are at a greater risk of serious and sometimes fatal toxicities of the nervous system. The extent of lead absorption from all unorthodox sources remains to be determined for our study population. But there is certainly enough evidence that some kohl or (surma) contain more lead than is consistent with modern public health standards.

CONCLUSIONS

Kohl is full of lead especially one that is traditionally done at home. It may be a potential cause of childhood lead poisoning. The public and responsible for health are not aware of the seriousness to used unsuspected traditionally used items. In addition, our results highlight the need for stricter health safety regulations for street vendors of product content the lead. The population of morocco is largely unaware of the hazards and health consequences of lead exposure, and they therefore lack prevention strategies.

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