



## **Toxic Effect of Heavy Metals In Cosmetic Products And Health Concern : A Review**

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### **ABSTRACT**

Growing demand of cosmetic products all over the world from teen to adult has increased awareness related to safety issue. The objective of this paper is to indicate the heavy metal that possess toxicological effect that can be found in cosmetic products. This paper also highlighted the health risk possess by such heavy metal in the cosmetic products. It is suggested that consumer aware over the toxic heavy metals used in their cosmetic and personal care products and the side effects it possess. Heavy metals toxicity to humans can result from long term exposure to consumer products such as the cosmetics and toiletries .It is obvious from the present study that the use of these cosmetic products exposes users to low concentration of toxic heavy metals which could constitute potential health risk to users due to accumulate in the biological system overtime .The purpose of this paper is to indicate appropriate toxicological effect of heavy metals in cosmetic products .The focus is on the heavy metals with known significant toxicological properties : Lead , Arsenic , Cadmium , Mercury , nickel , aluminium

**KeyWords:** Heavy Metals, Toxicological effect ,Cosmetic products .

### **INTRODUCTION**

Heavy metals are a natural part of the earth crust as well as they are present in water , soil and air as a result of industrial pollution .Thus , heavy metals are found in dyes and pigments used by the makeup industry<sup>[1]</sup>.The use of cosmetics as part of routine body care is as old as man . The demand for cosmetic products from around the world has increased rapidly due to the the growing awareness of the need to beautify the human body and the sharp rise in product advertisements in the media . Despite the high global demand for cosmetic products, the safety of these products is of great concern and has attracted the attention of researchers, toxicologists and regulators, with the common objective of ensuring the safety levels of ingredients in product <sup>[2]</sup>. Cosmetic products have the ability to penetrate the skin and accumulate underneath it as toxic constituents. People have reported cases of skin irritation , allergies and even cancer<sup>[3]</sup>.Cosmetic products are regulated for health and safety. There are concerns regarding the presence of harmful chemicals, including heavy metals, in these products<sup>[4]</sup>.It hasbeen that heavy metals, such as arsenic(As),cadmium(Cd),lead(Pb),and mercury (Hg),present a danger to humans and the environment. They are recognized as toxic , carcinogenic, toxic to reproduction and can generate allergic reaction if ingested or allowed to come into contact with our skin<sup>[5]</sup>. Cosmetics have been considered by many dermatologists often more serious than useful. They contain ingredient that are related to many disease such as eczemas , irritant contact dermatitis , reproductive system damage . There are variable types of cosmetic

products lipstick , lip gloss, mascara , eyes shadows ,blusher and powder, nailpolish and different types of moisturizing and lightening creams in these makeup products heavy metals are widely used . Cosmetics are one of the most severe reasons to release heavy metals <sup>[6]</sup> . Arsenic ,cadmium,cobalt,lead,mercury and nickel are element that are present naturally in the earth . They are among a group of substance commonly referred to as “Heavy Metals”<sup>[7]</sup>.Heavy metals toxicity to the humans and animals is the result of long term low or high leel exposure to pollutants common in our environment including in air we breathe ,water , food ,etc. Numerous consumer products like cosmetics and toiletries have been reported as a source of heavy metal revelation to human being .Heavy metal contamination is one of the important reasons behind the same problem. Heavy metals like lead and cadmium are common contaminant in various cosmetic products <sup>[8]</sup> .Absorption of heavy metals poisoning through the skin, especially through the repeated use of mainstream cosmetics and skincare products ,is a serious health threat<sup>[9]</sup>.The term heavy metal refers to any metallic chemicals element that has a relative high density greater than 58 km and it is toxic or poisonous at low concentration . They are dangerous because they tend to bio-accumulate or increase in concentration in biological cells overtime .In recent times, attention had been focused on cosmetics , disinfectants heavy metals in the human system without any information on their levels .The metals in lipstick enroot the mouth and swallowed during eating ,while some get to the body through the skin pores , nail polishes consisting heavy metals they reached in body through the porous keratinized nails.The amount that is actually absorbed from the digestive tract can vary widely ; depending on the chemical form of the metal ,the age and nutritional status of the individual . Once a metal is absorbed ,it distributes in tissue and organs .Exposure to heavy metals and metalloids at relatively low levels can cause adverse effects<sup>[10]</sup>. Eye cosmetics such as eye pencil have been identified as a suspected source of lead exposure to the ocular system in a number of adults and children .The use of leaded eye cosmetics have been observed to be strongly correlated with elevated blood lead levels . Skin whitening creams containing hydroquinone , corticosteroid and mercury.The use of cd in cosmetics products is due to its color property and it has been used as color pigment in many industries. Cd and its compounds are considered human carcinogens.<sup>[11]</sup>.

## **TOXIC EFECT OF HEAVY METALS:**

**Heavy Metals:** Lead, Mercury, cadmium, arsenic, nickel,aluminium

Heavy metals like lead, arsenic, mercury, aluminium, zinc, chromium and iron are found naturally occurring, are present in the environment and can make their way in trace quantities into raw materials. These substances end up in the products we consume and use every day. they can be found in pigments and other raw materials in all industries including the cosmetic industry. Revelation to heavy metals has been linked to health concerns includes reproductive, immune and nervous system toxicity. While some metals are contaminants of the chemical combining process, others serve as colourant<sup>[12]</sup>.Lead ,Arsenic,Cadmium, aluminium ,Nickel, and Mercury are the metals that are of the greatest concern and they are linked to all kinds of health problems<sup>[13]</sup>.

## **MERCURY**

Commonly found in - Lip product, Eyeliner, Blush eyeshadow, Foundation Concealer.<sup>[14]</sup> Mercury is a neurotoxin. Mercury has been used by many names such as mercurous chloride,Calomel, mercuric, mercurio or mercury <sup>[15]</sup>. Thisneurotoxin is extremely common metal in makeup such as lipstick and lip gloss, eyeliner, mascara. Mercury is also present in whitening, anti-aging, and antiseptic creams. Even in the small amounts, Mercury is absorbed very easily through the skin and can enter the bloodstream. Constant exposure to mercury comes with serious health side effects <sup>[16]</sup>.Studies showed that mercury toxicities were mainly associated with exploiting skin-lightening creams <sup>[17]</sup> .Mercury is not classified as a carcinogen in humans, however mercury chloride and methyl mercury are potentially carcinogenic in humans <sup>[18]</sup>. The

prolonged use of products containing mercury can lead to inflammation of the liver, kidney and urinary tract. Presence of mercury in skin creams has become a global public health problem. Mercury compounds voluntarily immersed through the skin on topical application and have the affinity to accumulate in the body<sup>[19]</sup>. They may cause allergic reaction , skin irritation or neurotoxic manifestations . Mercury is considered particularly toxic to the developing brain during pregnancy , infancy , and childhood<sup>[20]</sup> . Most of the imported skin creams may contain toxic levels of mercury and other heavy metals . The risk is serious , people are actually getting sick from mercury contamination from these products .Symptoms of mercury poisoning include tremors ,memory problems , irritability , change in vision or hearing<sup>[21]</sup> . In future, heavy metal ( mercury ) contents in cosmetic products exceeding the 0.1 mg/kg value are considered as technically avoidable<sup>[22]</sup>.

## **LEAD**

Commonly found in – lipstick. Millions of women put on lipstick every day without ever considering whether dangerous chemicals lurk inside the tube. Lead is neurotoxin and can be dangerous at small doses. Medical experts are clear that any level of lead exposure is unhealthy<sup>[23]</sup>.A neurotoxin commonly present in cosmetics among other materials. Many well-loved drugstore makeup brands use high levels of lead in their products and especially in their lipstick. When absorb into our system, lead tends to accumulate in our bones and tissue, but also in liver , kidney , and lungs. Long term exposure of even small amounts of lead can also do damage to the vital system in our body, namely cardiovascular, immune , and nervous system . Lead exposure also have relations to miscarriage, fertility problem , delays in puberty and other severe organ damage . it is no surprise that this heavy metal is also carcinogenic<sup>[24]</sup>.The heavy metal contents in lipsticks and probably other cosmetics may cause harm to consumers. Lipsticks have dangerous high lead contents<sup>[25]</sup>. Lead is linked to neurotoxicity such as learning , language and behavioural problems . It has been correlated to infertility, hormonal and menstrual irregularities , as well as delayed onset of puberty in girls and development of testes in boys<sup>[26]</sup> .Lead exerts adverse effects on numerous organs and systems including the central nervous system, the kidney and on the hematopoietic system . Exposure of lead is usually more in children, who are more prone to the effects of lead than adults . Children are particularly at risk for the subtle adverse effects of chronic low dose lead exposure, as are pregnant women/foetuses. Children absorb about 50% of ingested lead<sup>[27]</sup>. The toxicity of lead in case of recurrent exposure to relatively low levels may give undesirable health effects both acute and chronic poisoning and pathological change of organs and disease related to cardiovascular, kidney , bone , and liver<sup>[28]</sup>.

**Health concern Exposure to lead has been linked to a host of health concerns<sup>[29]</sup>:**

Neurotoxicity: It is associated to learning, language and behavioural problems .

Reduced fertility in both men and women Hormonal changes and menstrual irregularities.

Delayed onset of puberty in girls and development of testes in boys.

## **ALMUNIU**

Commonly found in: Deodorant, Antiperspirant products, Cosmetic colours. Aluminium compounds are a common ingredient used for its antiperspirant function. These compounds form a temporary barrier in the sweat duct that hinders the flow of perspiration to the skin s surface. This is believed cause toxins from the sweat to flow back into the bloodstream. Researchers have found that when applied and left on frequently on the skin near the breast, it may be absorbed and disrupt oestrogen levels. As. oestrogen may potentially promote the growth of breast cancer cells. Aluminium is also used in lipstick and other cosmetic products as a thickening agent<sup>[30]</sup>.

**Health Concern Exposure to Aluminium has been linked to a host of health concern** <sup>[31]</sup> -Breast cancer

### **CADMIUM**

Commonly found in –Mascara. Cadmium is classified as a human carcinogen. The absorption of cadmium through skin is very low, the strong solution would be in contact with the skin for several hours or longer. Significant dermal exposure can cause irritant dermatitis <sup>[32]</sup>. The presence of cadmium in the products and its absorption by the body can lead to kidney damage, lower bone mineral density, bronchitis, pulmonary oedema , chemical pneumonitis , including peripheral neuropathy with symptoms of tingling ,numbness and muscle weakness<sup>[33]</sup>.

**Health Concern –Exposure to cadmium has been linked to a host of health concern** <sup>[34]</sup> :Cancer , Tumours, Heart damage , Lung damage ,Birth defects

### **ARSENIC**

Commonly found in – Eyeliner. Arsenic exerts adverse effect due to pronounced affinity for skin and keratinizing structures including the hair and nails . Therefore , symptoms of acute overexposure include a variety of skin eruptions , alopecia and characteristic striation of the nails . Arsenic not act as a sensitizer, due to meagre skin stabbing ability of its naturally occurring compounds. The health effects of arsenic in human vary depending on the compound and form . Metallic arsenic is not immersed by the GIT and does not have any known unpleasant health effects. Carcinogenicity has been observed only in its inorganic form . Inorganic arsenic compounds are more acutely toxic than environmentally occurring organic arsenic . Dermal uptake is expected to be very limited. The study concluded that skin contact to arsenic may contribute less than 1% of the exposure from ingestion <sup>[35]</sup>. Arsenic is one of highly toxic metals and it can be absorbed via ingestion and inhalation. Arsenic accumulates in skin, hair, and nails . The exposure of arsenic can develop, liver enlargement, damage to nervous system, hyper-pigmentation, anorexia, keratosis, leukaemia, kidney cancer, and bladder cancer, ,dermatitis and death <sup>[36]</sup> .

**Health concern–Exposure to arsenic has been linked to a host of health concern** <sup>[37]</sup> - Non reproductive organ toxicity, Hormone disruption.

### **NICKEL**

Commonly found in – all types of makeup, especially in green or metallic shadow, as well as makeup brushes <sup>[38]</sup>. Nickel can cause allergic reaction when it comes in contact with the skin. Studies on animals show that if consumed in high amounts, it affects kidney, stomach and liver <sup>[39]</sup>. Nickel is one of the biggest cause of contact dermatitis. Nickel contact dermatitis cause either, mild itching and redness, or severe infections. if you are allergic to nickel, the only way to prevent allergic reaction is to prevent exposure. Nickel allergies can also cause eczema, which becomes worse in the summer heat<sup>[40]</sup>.

### **CONCLUSION**

Generally dermal penetration of heavy metal is considered lower risk than oral absorption, the penetration of an individual heavy metal may be influenced by a number of factors including physical -chemical properties of the mixture and the quality of the skin . Skin with lesions will absorb more. The specific danger of heavy metals is such that they bio accumulate, meaning that every trace exposure adds up. Heavy metals get store in the bones and stay in our bodies for decades. There are no perfectly safe and effective detox methods for heavy metals <sup>[41]</sup>. The heavy metal contents in cosmetic products may cause harm to consumers. This article

demonstrate that cosmetic products may contain or absorb heavy metals, for this reason, there is currently a potential global danger to the health and well-being of people <sup>[42]</sup>. It has been identified that the long term effect of the use of cosmetic products has the capacity to affect the health of consumer. Therefore long term continuous usage of cosmetic products should be avoided because mercury, lead, arsenic, cadmium, compound are readily absorbed through the skin, products containing heavy metal can lead to host number of disease . Consumer should also play their role by keeping themselves updated with knowledge and aware of the ingredients presence in the products they used.

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