



**ORIGINAL RESEARCH PAPER**

**Toxicology**

**COSMETIC TOXICOLOGY: HIDDEN UPCOMING DANGER'S TO THE HUMAN HEALTH- A REVIEW**

**KEY WORDS:** Cosmetics, Synthetic, Dreaded, Awareness.

**Shanti Manyala**

Assistant Professor, Department of Agad Tantra and Vyavhar Ayurved, Shubhdeep Ayurved Medical College and Hospital, Indore.

**Nidhi Tilwankar**

Assistant Professor, Department of Kaumarbhritya, Shubhdeep Ayurved Medical College and Hospital, Indore.

**ABSTRACT**

Cosmetics and personal care products (PCP) are used in huge quantities throughout the world, posing a threat to human health. The health, habits, routine job, climatic conditions and maintenance were responsible for individual's skin and hair beauty. With the growing industrialization and Urbanization, pollution and use of Synthetic substances has increased a lot. These synthetic substances and chemicals are posing a health threat to the individuals. Thus proper precautionary measures should be taken by the individuals and awareness should be generated among the public regarding the dreaded effects of these cosmetics on the human body.

**INTRODUCTION:**

Cosmetic and personal care products (PCP) means any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with the teeth and therefore the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odours<sup>[1]</sup>.

According to a widely accepted classification, cosmetics are often divided into leave-on and rinse-off products. A leave-on cosmetic may be a product that for its functions is meant to remain on the skin for a rather extended period; examples are perfumes, decorative cosmetics, body and face creams, and antiperspirants. On the contrary, a rinse-off cosmetic may be a product designed to be rinsed off after a short time stay on the skin or mucous membranes, such as soaps, shower gels, shampoos, soaps, and toothpastes.<sup>[2]</sup>

Every season many new products are released in the market and it's being hard to keep track on safety of every product and few products may carry carcinogenic contaminants<sup>[3]</sup>. There are concerns regarding the presence of harmful chemicals, including heavy metals, in these products. Some cosmetics may contain aluminum (Al), classified as a light metal. As there is no single and effective regulation around the world, few cosmetics may contain high amounts of these heavy metals in their formulation in cosmetics like hair and herbal, face and body care products, colourful cosmetics. These elements can accumulate on the skin and internal organs, causing toxic effects that can be classified into topical (mainly contact dermatitis), and systemic (systemic allergic dermatitis)<sup>[4]</sup>. Now a day's most of skin care (cosmetics) products contain heavy metals such as arsenic, antimony, cobalt, chromium, cadmium, mercury, and nickel as impurities or ingredients<sup>[5]</sup> (See Table:1, 2)

Heavy metals which can be absorbed in the body through dermal absorption for a long time may cause various health problems. As a matter of fact, all the ingredients used in cosmetic products meet certain regulatory requirements. However, the use of many substances is allowed within certain limits, due to their toxicity at higher concentrations. Other important aspects should be considered as, for instance, the possibility of long-term effects. On the other hand, other substances may induce several acute adverse side-effects, i.e. contact dermatitis and allergic reactions. Moreover, the everyday use and continuous exposition of humans to a wide range of personal care products and to different kinds of chemicals, derived from several sources, may cause the so-called "cocktail effect" due to the synergistic interaction of different substances and, also, the "additive effect" because of

the presence of the same ingredient in many products<sup>[6]</sup>.

Several health surveillance agencies all over the world demand not to use some restricted cosmetic ingredients listed in the restriction's list. To improve its products, the industries always act quite creative and always use new cosmetic ingredients not mentioned in the restriction's list. Such ingredients are new potential allergens. Unlike medicines, there is no a specific agency to assess the safety of cosmetic products, no marketing authorization with specific requirements, no evaluation of the risk-benefit ratio and no guarantee of constancy from one batch to another<sup>[8]</sup>. The health risks associated with the use of cosmetic products become currently an emerging public health problem, where about 12% of users in the general population had experienced undesirable effects with one or several cosmetic products in the last nine years<sup>[7, 9]</sup>. For the maintenance of individual's skin and hair beauty the habits, routine job, health, climatic conditions are always responsible<sup>[9]</sup>.

Table:1 Adverse effects of cosmetic ingredients

Sr.no	Ingredient	Systemic Effect	Adverse Action
1.	Lead(Pb)	Reproductive System	Ÿ Miscarriage, Reduced fertility in men and women, Hormonal changes. Ÿ Menstrual irregularities and delays in puberty onset in girls. Ÿ Pregnant women and young children are also vulnerable because lead crosses the placenta and may enter the foetal brain. [10]
2.	Cadmium (Cd)	Digestive system & Excretory system	Ingestion of high levels of cadmium Leads to severe stomach irritation, vomiting, and diarrhea, while exposure to Lower level for a long time Lead to kidney damage, bone deformity, and the ability of bones to break easily [11]
3.	Chromium (Cr)	Integumentary system (i.e., Skin, Hair, Nail, scales etc.)	Ulcerations, dermatitis, and allergic skin reactions.

4.	Mercury (Hg)	Nervous system toxicity, Reproductive system, Immune and Respiratory toxicity. [12]	
5.	Antimony (Sb)	Respiratory system & Digestive system	Ÿ Pneumoconiosis, alterations in pulmonary function, bronchitis, emphysema. Ÿ Abdominal pain, vomiting, diarrhea and ulcers.[13,14]
6.	Arsenic (Aa)	Circulatory system, Nervous system, Digestive system, Respiratory system, Urinary system.	Skin and circulatory disorder, Peripheral nervous disorder, Increase risk of GIT, lung, urinary system cancers.[13,14]
7.	Cobalt (Co) & Nickel (Ni)	Integumentary system (i.e., Skin, Hair, Nail, scales etc.)	Allergies such as contact dermatitis[13,14]

Table: 2[13,14] Ingredients commonly found in products

Sr.no	Ingredients	Product use
1.	Lead(Pb)	Lead is found in dyes for hair (such as lead acetate) and lipsticks, eyeliner, eye pencil, hair cream in their inorganic form, and can be minimally absorbed by the skin.
2.	Cadmium (Cd)	Hair creams, lipsticks and skin cream
3.	Chromium (Cr)	Eye liner, Eye pencil, Eyeshadow, lipstick and make-up powder.
4.	Mercury(Hg)	
5.	Antimony (Sb)	Lipsticks, eye pencils and face powder.
6.	Arsenic (Aa)	Make-up powder and skin cream
7.	Cobalt (Co) & Nickel (Ni)	Eye shadow, face paint, hair cream and lipstick

**AIM & OBJECTIVES:**

Too alert and bring awareness among the individuals in the society on the use of cosmetics.

**MATERIAL AND METHODS:**

The material related with this article is been referred from the various E- media ( review articles from reliable sources).

**Literature Review:**

The word cosmetic was acquired from the Greek word “kosmetikos” meaning having the power, order, skill in decorating.<sup>[15]</sup> The birth of cosmetics form a continuous narrative throughout the history of man as they developed. The man in ancient times 3000BC used colours for the decoration to charm the animals that he wished to hunt and also the man survived attack from the rival by colouring his skin and adorned his body for protection to provoke fear in an enemy (whether man or animal). The origin of cosmetics was associated with hunting, fighting, religion and credulity and later associated with medicine. The knowledge finally dissociated from medicine and finally to the pharmacy. The man in ancient time had magic tip towards impressing others with their looks; at the time there were no fairness creams or any cosmetics surgeries to modify the appearance.<sup>[16]</sup>

**The beginning of complications due to the use of cosmetics:**

The use of pigmented lead-based cosmetics used by

Egyptians is characterized as the earliest evidence of the use of cosmetics and their complications. Subsequently, rouges and lipsticks appeared whose reddish coloration was attributed to mercury sulphide. Such a compound, when ingested by pregnant women, caused miscarriage spontaneously. Another toxic compound capable of causing damage to the organism was the arsenic used by Greeks and Romans in chemical depilatory solutions<sup>[17]</sup>. With the advancement of knowledge about the physiology of skin and its components, the pharmaceutical industries began to invest in new active principles and vehicles for the production of cosmetics. Thus, new quality control tests within the manufacture of such cosmetics must be also updated in order to ensure safety in the use of such compounds<sup>[18]</sup>. Several regulatory agencies around the world are dedicated to the control and regulation of commercial activities, safety and quality control of cosmetics. Although there are rules and quality control tests to be followed for the manufacture of a cosmetic, these regulatory mechanisms are not fully effective, as the adverse effects still persist in the cosmetic consumer population<sup>[19]</sup>.

**DISCUSSION:**

Cosmetic and personal care products are used in huge quantities throughout the world; as a result of their regular use, they are continuously released into the environment in very large amounts. The product we use poses treat to the human health and ecosystem as most of these products are active biologically and are characterized by persistence and bioaccumulation potential. So there is a need to spread awareness among the people in the society. Throughout world cosmetics have been used as a part of routine body care by all classes of people. In this way, the risk of intoxication, allergic processes, prolonged chemical exposure, side effects and indiscriminate use are also increased. So there is need to spread awareness among and people and give them idea about natural or herbal care products as they are less harmful when compared to cosmetics.

**CONCLUSION:**

In front of the arising use of cosmetic products and therefore the larger exposure to the formulas compounds for a large time and frequency, the side effects of those products become more frequent within the population around the world. Women and men everywhere the planet use large amount of cosmetic products in pursuit of everlasting youth, ignoring the probable health risks.

**Acknowledgment:**

Dean (MGAC & RC)

**REFERENCES:**

1. Regulation (EC) No 1223/2009 of the European Parliament and of the Council of 30 November 2009 on cosmetic products. Available online: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:342:0059:0209:en:PDF> (accessed on 10 March 2017).
2. Brausch, J.M.; Rand, G.M. A review of personal care products in the aquatic environment: Environmental concentrations and toxicity. *Chemosphere* 2011, 82, 1518–1532. [CrossRef] [PubMed]
3. Peter AL, Viraraghavan T. Thallium: a review of public health and environmental concerns. *Environ Int.* 2005;31(4):493–501.
4. Borowska S, Brzóska MM. Metals in cosmetics: Implications for human health. *J Appl Toxicol.* 35(6):551–72 (2015).
5. Nesterenko PN, Jones P. Single-column method of chelation ion chromatography or the analysis of trace metals in complex samples. *J Chromatogr A.* 1997;770(1–2):129–35.
6. A.Panico, F.Serio, F.BAgordo, T.Grassi, A.Idolo, M.De Giorgi, M.Guido, M.Congedo, A.De Donno. Skin Safety and Health Prevention: an Overview of Chemicals in Cosmetic Products *J Prev Med Hyg.* 2019 Mar; 60(1): E50–E57 <https://doi.org/10.15167/2421-4248/jpmh2019.60.1.108>
7. Nicolopoulou-Stamati P, Hens L, Sacco AJ. Cosmetics as endocrine disruptors: are they a health risk? *Rev Endocr Metab Disord.* 16(4):373–83 (2015).
8. Vigan M, Castelain F. Cosmetovigilance: definition, regulation and use “in practice.” *Eur J Dermatology.* 24(6):643–9 (2014).
9. Prashant L Kole, Hemant R Jadhav, Prasad Thakurdesai and Anantha Naik Nagappa, cosmetics potential of herbal extracts, *Indian Journal of Natural Products and Resources (IJNPR) [Formerly Natural Product Radiance (NPR)],* 2005;4(4):315-321.
10. Horowitz Y, Greenberg D, Ling C, Lifshitz M. Acro-dynia: a case report of two siblings. *Arch Dis Child.* 2002;86:453–5.
11. Horowitz Y, Greenberg D, Ling C, Lifshitz M. Acro-dynia: a case report of two siblings. *Arch Dis Child.* 2002;86:453–5.
11. Campaign for Safe Cosmetics, Lead in lipstick 2007 <http://www safecosmetics.org/article.php?id=223>

12. UNEP. Mercury in products and wastes. United Nations Environment Programme. Geneva: Division of Technology, Industry and Economics, Chemicals Branch; 2008.
13. Juhász MLW, Marmur ES. A review of selected chemical additives in cosmetic products. *Dermatol Ther.* 27(6):317-22 (2014).
14. Bocca B, Pino A, Alimonti A, Forte G. Toxic metals contained in cosmetics: A status report. *Regul Toxicol Pharmacol* [Internet]. 68(3):447-67 (2014).
15. Pandey Shivanand, Meshya Nilam, D.Viral, Herbs Play an Important Role in the Field of Cosmetics, *International Journal of Pharm Tech Research*, 2010; 2(1):632-639.
16. V P Kapoor, Herbal cosmetics for skin and hair care, *Indian Journal of Natural Products and Resources (IJNPR)* [Formerly *Natural Product Radiance (NPR)*], 2005; 4(4): 306-314.
17. Draelos ZD. Cosmetics: The Medicine of Beauty. *J Cosmet Dermatol.* 14 (2):91 (2015).
18. Alani JI, Davis MDP, Yiannias JA. Allergy to cosmetics: A literature review. *Dermatitis.* 24(6):283-90 (2013).
19. Dreno B, Araviiskaia E, Berardesca E, Bieber T, Hawk J, Sanchez-Viera M, et al. The science of dermocosmetics and its role in dermatology. *J Eur Acad Dermatol Venereol.* 28(11):1409-17 (2014).