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Review Article

Review On Risk Of Toxic Heavy Metals Present In Cosmetic Products

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ABSTRACT

This review provides a comprehensive insight into the content of different toxic heavy metals found in cosmetic products and their effects at the site of application and on several organs via the dermal route of administration. Cosmetic Products includes Personal care products and facial cosmetics which are commonly used by millions of consumers on a daily basis. The use of cosmetics has been practiced since antiquity as apart from cleansing, cosmetics also beautify and alter the appearance hence making the individual more appealing and attractive. With industrialization and the use of petrochemically-derived substances, the cosmetic formulation changed from one based on natural products to one which is mainly based on petrochemicals. Heavy metals such as lead, Mercury, Cadmium, Arsenic, Nickel, Chromium, Zinc, ion, Copper and manganese are metal detected in various types of cosmetics (colour cosmetics, face and body care products, hair cosmetics, herbal cosmetics, etc) but harmful when they occur in excessive amounts, Metals occurring in cosmetics may undergo retention and act directly in the skin or be absorbed through the skin into the blood, accumulate in the body and exert toxic effects in various organ. Regulatory bodies such as FDA (food and drug administration), NAFDAC (National Agency for Food and Drug Administration and Control) should be involved in the effective monitoring of the import, production, sale, distribution promotion and processing of cosmetics.

INTRODUCTION

Cosmetics, derived from the Greek word 'kosmtikos,' are utilized by both men and women for enhancing appearance and masking skin

imperfections. They encompass a wide range of products including skincare creams, lipsticks, fragrances, hair dyes, and more. Cosmetics are intended to be applied superficially to the body to

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maintain its health and appearance without altering physiological functions.

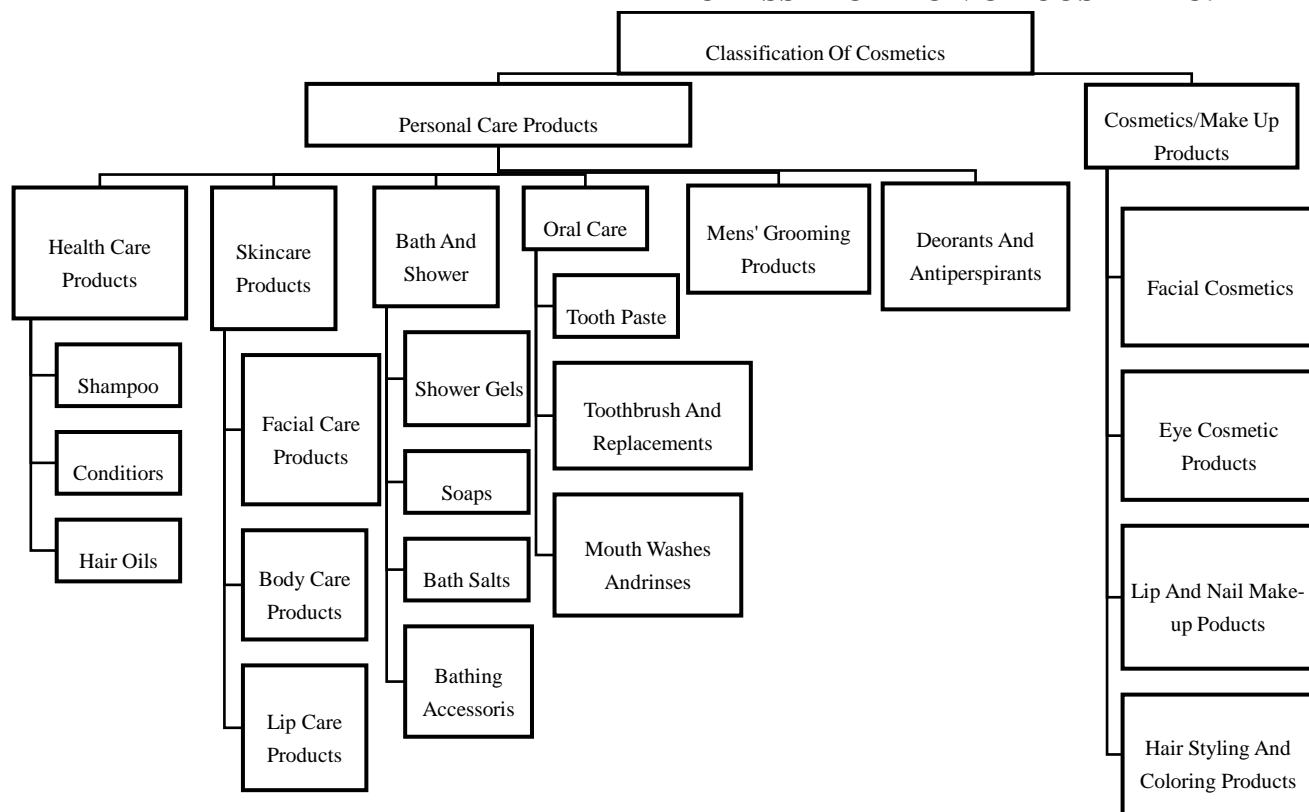


Figure No. 1: Cosmetic Products

Throughout history, cosmetics have been employed for cleansing and enhancing attractiveness. However, their safety evaluation gained significant attention in the latter half of the 20th century, particularly as research highlighted potential risks associated with exposure to various chemicals present in these products. While cosmetic formulations have evolved from natural

ingredients to petrochemical-based compositions due to industrialization, consumer demand has led to a resurgence in the use of natural ingredients. Despite this trend, heavy metals such as lead, mercury, cadmium, arsenic, and nickel, along with other elements like copper, iron, chromium, and cobalt, are still found in various cosmetics. These metals can accumulate in the body through dermal absorption, leading to toxic effects in different organs. The presence of these heavy metals in cosmetics poses health risks, including neurotoxicity, carcinogenicity, and other adverse effects on internal organs. Regulatory bodies have set limits for heavy metal content in cosmetics to mitigate these risks. However, it's crucial for consumers to remain informed and cautious about the products they use on their bodies.

CLASSIFICATION OF COSMETIC:



RISKS OF HEAVY METALS IN COSMETICS [6]

The risks associated with heavy metals in cosmetics depend on various factors such as the concentration of metals, synthesis methods,

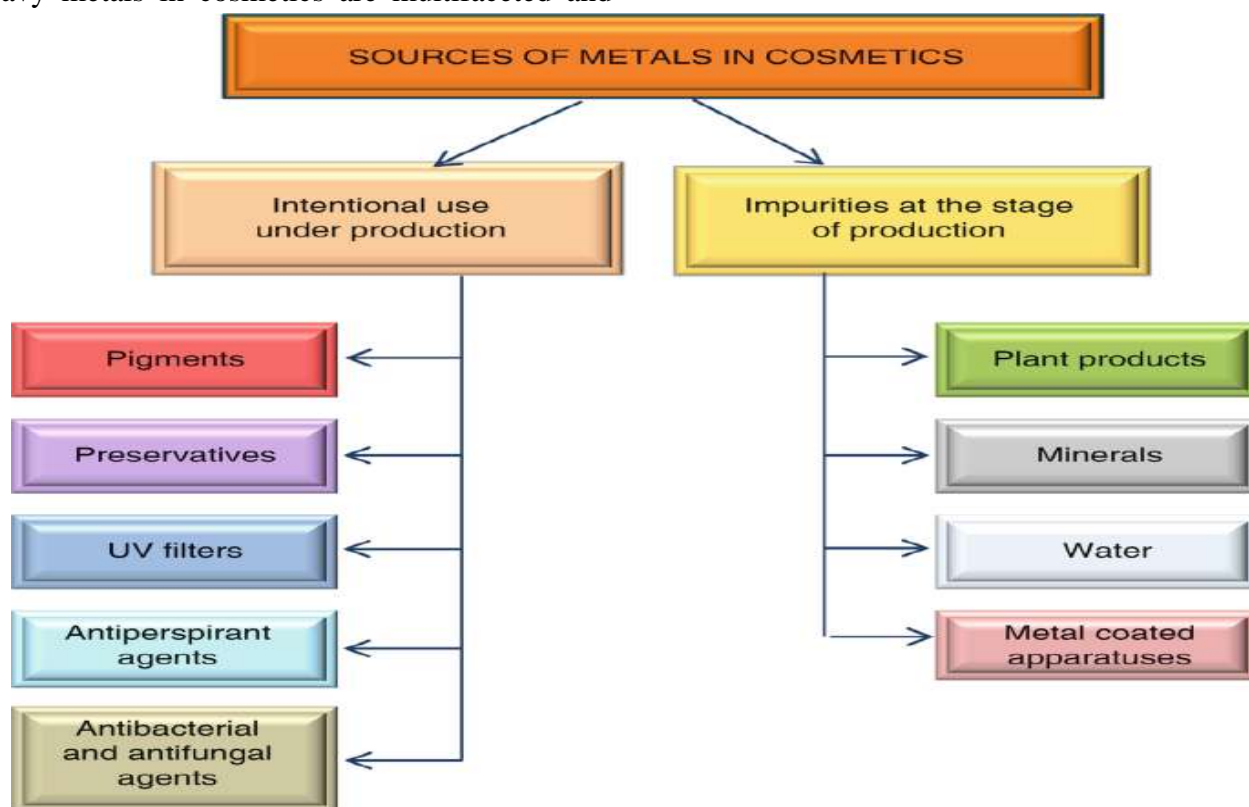
penetration ability, area of skin exposure, duration of exposure, and frequency of use. Additionally, individual factors like health, diet, age, and economic status also influence the risks.

There's been a steady rise in cosmetic usage among both genders and across age groups, including children, which increases the risk of exposure to heavy metals. This heightened exposure disregards the accumulation effects of these metals in the body over time. Chronic daily exposure to heavy metals through dermal absorption follows the sequence of mercury > lead > cadmium for adults. This chronic exposure contributes to long-term health problems, including the potential for cancer development, which is influenced by factors such as overuse and penetration ability of the metals in cosmetics. In summary, the risks associated with heavy metals in cosmetics are multifaceted and

influenced by various factors, including individual characteristics and usage patterns. Efforts to mitigate these risks require awareness, regulation, and informed consumer choices.

TOXIC HEAVY METALS IN COSMETICS [8]

Heavy metals are elements that are primarily found in the d and p-blocks of the periodic table showing a metallic character and an ability to form salts. Some sources specify that heavy metal should have a high density. Such metals include lead, cadmium, nickel, mercury and arsenic among others.



Heavy metals are widely distributed in both living and non-living matrices, posing a concern due to their potential to disrupt physiological functions by replacing beneficial metals. This phenomenon is observed across various organisms, including mammals, humans, insects, and plants. Accumulation of heavy metals in biological systems can occur through the daily or repeated use of cosmetics like face powders, lipsticks, and

eye shadows, as these products commonly contain heavy metals.

REGULATIONS FOR COSMETICS [1-4]

In India, cosmetics are regulated under the Drugs and Cosmetics Act of 1940 and Rules of 1945, with labeling declarations enforced by the Bureau of Indian Standards (BIS). BIS establishes standards for cosmetics listed under Schedule 'S' of the Drugs and Cosmetics Rules of 1945. Dyes,

colors, and pigments used in skin creams and lipsticks must comply with IS 4707 (Part I), subject to the provisions of Schedule Q of the Drugs and Cosmetics Act and Rules. Other ingredients must adhere to the provisions of IS

4707 (Part 2). Rule 134 of the Drugs and Cosmetics Rules imposes restrictions on cosmetics containing dyes, colors, and pigments not specified by the Bureau of Indian Standards and Schedule Q.

As per Indian authorities Synthetic Organic Colors and Natural Organic Colors used in the Cosmetic shall not contain more than:

Heavy metals	Limit (ppm)
As	2
Pb	20
Other heavy metals	100

The Cosmetic Ingredient Review Expert Panel established by Food and Drug Administration (FDA) in the USA issued limits are:

Heavy metals	Limits (ppm)
As	5
Pb	5
Other Heavy Metals	20

The World Health Organization (WHO) set limits for heavy metals are:

Heavy Metal	Limits (ppm)
Pb	10
Cd	0.3
Hg	1

THE PRESENCE OF TYPICAL HEAVY METALS IN COSMETICS AND THEIR EFFECTS: [11-23]

The excerpt provided contains detailed information about various heavy metals commonly found in cosmetic products, including lead, cadmium, copper, cobalt, chromium, nickel, mercury, iron, arsenic, zinc, and manganese. Each heavy metal has its own mechanism of action and potential health effects when absorbed by the body through dermal exposure. Lead, for example, is neurotoxic, nephrotoxic, and hepatotoxic, with detrimental effects on various organs when accumulated in tissues. Cadmium can concentrate in bones, kidneys, and teeth and may lead to skin rashes and epithelial problems. Copper, essential for various physiological functions, can have harmful effects at high levels, including brain damage, liver cirrhosis, and anaemia. Cobalt, commonly used in cosmetics, can cause allergic

contact dermatitis and other adverse health effects. Chromium, both trivalent and hexavalent, can induce skin ulcerations, dermatitis, and allergic reactions. Nickel, present in metal alloys, can activate cellular pathways leading to neoplastic transformation. Mercury, inorganic or organic compounds, can lead to kidney damage, nervous system disorders, and even cancer. Iron, while essential in small amounts, can be toxic in excessive levels, leading to cellular damage and organ dysfunction. Arsenic, a well-known environmental contaminant, can cause hyperpigmentation, keratosis, and various types of cancer. Zinc, although essential, can cause health problems such as skin irritations and gastrointestinal issues at high concentrations. Manganese, necessary for antioxidant enzyme systems, can be fatal in excess, causing developmental abnormalities and nervous system damage. The mechanisms of toxicity for these

heavy metals often involve oxidative stress, DNA damage, disruption of cellular functions, and the induction of apoptosis. These metals can accumulate in the body over time, leading to chronic health effects. Dermal exposure is a significant pathway for heavy metal uptake, as cosmetics are often applied directly to the skin.

Understanding the potential health hazards of heavy metals in cosmetics is crucial for consumer safety, especially considering the widespread use of these products. Regulation and monitoring of heavy metal content in cosmetics are essential to mitigate risks to human health.

CONTENTS OF HEAVY METALS IN DIFFERENT COSMETIC PRODUCTS [2]

The content of heavy metals in face products; cosmetics and face care products

Cosmetic Products	Pb	Cd	Ni	Hg	As
Lipsticks	<DL-252.4	ND-60.20	ND-22.8	<DL- 80.00	0.01–6.931
Eye-shadows	<DL-81.5	<DL-55.59	< 0.5–359.4	<DL-181.0	<DL-1630
Eyebrow pencils and eye liners	0.109–61.22	ND-1.12	2.1–10.52	ND-67.42	ND-2.071
Mascaras	ND-12.51	ND-0.034	ND-0.028	ND-0.002	0.050–1.656
Make-up foundation	<DL-90	<DL-17	<DL-13.1	48.99–60.77	0.12–1.0
Face paints	0.02–370	0.01–19.2	7.6 ppm	ND-0.004	0.125
Face cream	ND-1.9	ND-0.37	ND	ND-1.27	ND-0.171
Toothpaste	ND-18.092	ND-2.490	0.025–18.535	ND-13.14	0.06–26.94

The content of heavy metals in body products

Cosmetic Products	Pb	Cd	Ni	Hg	As
Body lotions	<DL-47.5	ND	ND-0.003	<DL-47.5	ND-0.007
Hair shampoos and conditioners	0.66–54.56	ND	0.01–0.06	ND-21.08	0.002–0.2
Cleansers	0.04–22.14	ND	ND-0.08	ND-0.72	ND-0.009
Lotions	0.068–8.29	0.007–2.13	0.012–6.29	18.98–19.02	1.537–1.543
Hair dyes and creams	0.402–17.70	0.001–1.11	0.081–4.167	53.74–90.32	0.16–0.71
Tonic creams	0.35 – 0.55	0.35–0.55	3.40 – 4.70	-	-
Beauty cream	14.38 –50.39	2.40 –6.27	0.0175 –5.09	47.17–124.8	5.08 –10.74

The content of heavy metals in face and body products

Cosmetic Products	Pb	Cd	Ni	Hg	As
Skin lightening creams	<DL-143	0.1–1.276	2.59–11.17	<DL-126,000	0.7–12.30
Sunblock cream	ND-6.889	ND-0.155	ND-12.37	ND-1.62	ND-0.01

MEASURED LEVELS OF HMS (MG/KG) IN THE COSMETIC PRODUCTS IN DIFFERENT BRAND

[7]

Brand	CN	SC	Cd	Cr	Fe	Ni	Pb
Lotions (n=90)							
Nivea	Dubai	L1	2.1 ± 0.2	0.08 ± 0.01	2.42 ± 0.38	3.24 ± 0.41	4.57 ± 0.31
Mother care	Pakistan	L2	0.17 ± 0.17	0.42 ± 0.37	1.72 ± 1.33	6.11 ± 0.24	4.32 ± 0.59
Vaseline	Indonesia	L3	0.03 ± 0.02	0.04 ± 0.01	0.36 ± 0.02	1.97 ± 0.07	1.02 ± 0.33
Olivia	Pakistan	L4	Bdl	bdl	0.58 ± 0.03	0.83 ± 0.04	0.77 ± 0.21
Care Natural Honey Lotion	Pakistan	L5	Bdl	bdl	0.29 ± 0.03	0.47 ± 0.12	1.22 ± 0.25
Jergens	Dubai	L6	Bdl	bdl	0.40 ± 0.3	2.50 ± 0.38	1.87 ± 0.22
Vaseline	South Africa	L7	Bdl	bdl	0.27 ± 0.19	1.19 ± 1.21	1.45 ± 0.16



Hollywood Style	USA	L8	Bdl	bdl	0.50 ± 0.13	2.27 ± 1.35	1.67 ± 0.03
Rivaj UK	Pakistan	L9	Bdl	bdl	0.67 ± 0.01	2.33 ± 1.17	1.89 ± 0.20
Bath & Body Work	USA	L10	Bdl	bdl	0.62 ± 0.10	1.70 ± 0.53	3.18 ± 0.04
Garnier body lotion	London	L11	Bdl	bdl	0.38 ± 0.52	3.21 ± 0.47	3.30 ± 0.16
Vaseline dry skin repair	South Africa	L12	0.01 ± 0.05	bdl	0.68 ± 0.08	3.41 ± 0.67	3.87 ± 0.32
Vaseline Olvera	Malaysia	L13	0.03 ± 0.03	bdl	0.58 ± 0.08	1.83 ± 1.16	4.14 ± 0.04
Remembrance	Ireland	L14	0.21 ± 0.02	0.59 ± 0.01	2.10 ± 0.3	6.15 ± 0.15	6.97 ± 0.21
Dove	India	L15	0.25 ± 0.03	0.62 ± 0.04	2.71 ± 0.63	6.24 ± 0.1	7.19 ± 0.16
Olay	Malaysia	L16	0.23 ± 0.04	0.61 ± 0.03	1.88 ± 0.57	5.95 ± 0.08	7.30 ± 0.30
Enchanteur	Dubai	L17	0.25 ± 0.04	0.66 ± 0.01	2.23 ± 0.70	6.29 ± 0.12	7.53 ± 0.31
Ponds	Pakistan	L18	Bdl	0.01 ± 0.04	0.89 ± 0.04	bdl	0.68 ± 0.08
Johnson's baby lotion	Italy	L19	0.27 ± 0.02	0.67 ± 0.03	2.01 ± 0.7	6.16 ± 0.33	7.94 ± 0.10
Natural fresh watermelon	France	L20	0.26 ± 0.01	0.69 ± 0.02	2.42 ± 0.31	6.15 ± 0.1	8.29 ± 0.09
Golden pearl lotion	Pakistan	L21	0.10 ± 0.03	0.01 ± 0.02	0.51 ± 0.0	1.73 ± 0.39	0.57 ± 0.18
Cream 21	Germany	L22	Bdl	bdl	0.35 ± 0.08	2.63 ± 0.19	1.071 ± 0.002
Vaseline Petroleum jelly	Pakistan	L23	Bdl	bdl	0.34 ± 0.05	2.35 ± 0.29	1.49 ± 0.03
Salon 7day protection	Pakistan	L24	0.17 ± 0.01	0.13 ± 0.0	7.01 ± 0.14	0.08 ± 0.01	0.34 ± 0.02
MIEIVIC	China	L25	0.14 ± 0.02	0.12 ± 0.0	5.81 ± 0.4	0.08 ± 0.04	0.30 ± 0.02
Cream 24 Hour	England	L26	0.16 ± 0.02	0.11 ± 0.0	5.64 ± 0.4	0.07 ± 0.02	0.22 ± 0.04
Floral Rush	Dubai	L27	0.07 ± 0.06	0.07 ± 0.02	4.85 ± 1.34	0.01 ± 0.0	0.07 ± 0.1
Cucumber Melon	USA	L28	0.12 ± 0.02	0.08 ± 0.0	5.20 ± 0.71	0.05 ± 0.02	0.26 ± 0.11
Glysolid	Italy	L29	0.14 ± 0.0	0.07 ± 0.01	5.48 ± 0.20	0.066 ± 0.004	0.35 ± 0.06
Meijer Moisturizing lotion	USA	L30	0.15 ± 0.01	0.12 ± 0.02	5.31 ± 0.35	0.08 ± 0.02	0.44 ± 0.051
		Max.	2.13	1.00	7.01	6.29	8.29
		Min.	0.007	0.008	0.271	0.012	0.068
		Mean	0.257	0.283	2.140	2.592	2.809
		SE	0.015	0.009	0.070	0.076	0.091

CN. Country name, SC. Sample code, bdl. below detection limit

Analysis of 30 lotion brands (90 samples) revealed significant variations in heavy metal (HM) levels

($p < 0.05$). Cadmium (Cd) levels were highest in L1 (2.13 ± 0.15 mg/kg), with several brands below detection limits. All Cd levels complied with Canada's 3 mg/kg limit.

Chromium (Cr) levels varied, with some brands below detection limits and max in L20 (0.69 ± 0.02 mg/kg), within the 50 mg/kg safe limit. Iron (Fe) levels ranged from 0.27 to 7.01 mg/kg, within acceptable ranges. Nickel (Ni) levels varied, with max in L17 and lowest in L27, but below detection

in L18. Recommended Ni levels for skin contact products are <1.0 mg/kg. Lead (Pb) levels ranged from 0.07 to 8.29 mg/kg, within regulatory limits (Canada: 10 mg/kg, USFDA: 20 mg/kg). Overall, heavy metal levels generally met regulations, with exceptions, ensuring consumer safety.

Measured levels of Heavy Metals in 6 brands of hair dyes

Brand	CN	SC	Cd	Cr	Fe	Ni	Pb	
Hair Dyes (n = 18)								
Olivia (non-metallic dye)	Pakistan	D1	Bdl	bdl	0.27 ± 0.33	2.5 ± 1.8	4.72 ± 0.05	
Revlon	Italy	D2	0.001 ± 0.021	0.05 ± 0.02	0.32 ± 0.18	3.79 ± 1.0	5.02 ± 0.15	
Garnier Black	London	D3	Bdl	0.08 ± 0.01	0.26 ± 0.30	3.06 ± 0.88	5.33 ± 0.18	
Color Pro	Greece	D4	0.03 ± 0.02	0.12 ± 0.01	0.28 ± 0.27	3.82 ± 0.27	5.67 ± 0.23	
Keune	Holland	D5	0.03 ± 0.03	0.13 ± 0.02	0.42 ± 0.22	4.17 ± 0.23	5.84 ± 0.19	
Garnier Dark Brown	France	D6	0.17 ± 0.02	0.06 ± 0.02	Bdl	0.08 ± 0.02	0.40 ± 0.11	
			Max.	0.169	0.130	0.416	4.167	5.835
			Min.	0.001	0.048	0.263	0.081	0.402
			Mean	0.057	0.086	0.310	2.900	4.496

Measured HM levels in 6 hair dye brands (n = 18) showed significant Cd variation. D6 had the highest Cd (0.17 ± 0.02 mg/kg), differing significantly from others. Cr was highest in D5, Fe in D5, Ni in D6, and Pb in D5 and D4. D6 had the lowest Pb (0.40 ± 0.11 mg/kg), significantly different from others.

Measured levels of Heavy metals in 9 brands of Foundations

Brand	CN	SC	Cd	Cr	Fe	Ni	Pb	
Foundations (n = 27)								
Dermacol	Europe	F1	0.06 ± 0.03	0.19 ± 0.03	45.4 ± 12.0	4.79 ± 1.33	3.38 ± 0.26	
Garner BB Cream	Germany	F2	0.12 ± 0.03	0.23 ± 0.04	5.6 ± 3.3	5.61 ± 0.38	3.56 ± 0.13	
Cool Beauty	Pakistan	F3	0.16 ± 0.04	0.20 ± 0.01	5.3 ± 2.0	5.46 ± 0.18	3.69 ± 0.04	
Maybelline New York	France	F4	0.10 ± 0.0	0.23 ± 0.0	7.0 ± 4.0	5.96 ± 0.21	3.73 ± 0.20	
Flormar Perfect Coverage	Turkey	F5	0.12 ± 0.0	0.28 ± 0.02	3.0 ± 0.1	5.83 ± 0.10	3.95 ± 0.15	
BB Cream Fair & lovely	India	F6	0.13 ± 0.01	0.19 ± 0.0	2.3 ± 1.0	5.66 ± 0.4	2.78 ± 2.01	
Fenty Beauty	Italy	F7	0.12 ± 0.01	0.26 ± 0.01	8.3 ± 3.1	6.34 ± 0.33	1.94 ± 0.1	
DMGM Secret Wonder	Italy	F8	0.12 ± 0.02	0.26 ± 0.01	6.3 ± 1.2	6.02 ± 0.1	2.42 ± 0.06	
Yardley Foundation	London	F9	0.06 ± 0.02	0.30 ± 0.01	4.0 ± 0.1	5.49 ± 0.29	1.98 ± 0.29	
			Max.	0.157	0.300	45.42	6.336	3.952
			Min.	0.059	0.186	2.294	4.788	1.944
			Mean	0.109	0.238	9.638	5.684	3.047
			SE	0.003	0.004	1.507	0.049	0.087

Nine foundation brands (n = 27) showed Cd levels ranging from 0.06 to 0.16 mg/kg. F9 had the highest Cr (0.30 ± 0.02 mg/kg), while Fe ranged widely. Ni varied from 4.79 to 6.34 mg/kg, and Pb from 1.94 ± 0.16 to 3.95 ± 0.15 mg/kg.

Measured levels of Heavy metals in 6 brands of Lipsticks

Brand	CN	SC	Cd	Cr	Fe	Ni	Pb
Lipsticks (n = 18)							
Christine Princess	Pakistan	LS1	0.15 ± 0.03	0.32 ± 0.01	3.0 ± 2.0	6.49 ± 0.14	4.72 ± 0.17
Be cute (Velvet sensation)	Pakistan	LS2	0.19 ± 0.0	0.33 ± 0.01	11.0 ± 5.00	6.48 ± 0.06	5.02 ± 0.19
KEUNA (MATTE)	France	LS3	0.2 ± 0.1	0.46 ± 0.03	30.0 ± 10.0	6.59 ± 0.18	5.31 ± 0.29
Etude Real Australian	Australia	LS4	0.14 ± 0.04	0.36 ± 0.01	11.0 ± 4.0	6.69 ± 0.22	5.59 ± 0.07
L'Oreal Paris	France	LS5	0.20 ± 0.04	1.0 ± 0.01	6.1 ± 1.2	6.92 ± 0.02	5.89 ± 0.23
Toy lipstick	China	LS6	0.05 ± 0.01	0.07 ± 0.01	Bdl	bdl	0.40 ± 0.0
		Max.	0.203	0.465	29.74	6.922	5.889
		Min.	0.051	0.074	2.530	6.483	0.404
		Mean	0.150	0.335	11.948	6.636	4.488
		SE	0.009	0.024	1.753	0.030	0.341

In 18 lipstick brands, heavy metal concentrations varied significantly ($p < 0.05$). LS5 had the highest Cd (0.20 ± 0.04 mg/kg) and Pb (5.89 ± 0.23 mg/kg), while LS6 had the lowest Cd (0.05 ± 0.01 mg/kg) and Pb

Measured levels of Heavy metals in 6 brands of Sunblock

BRAND	CN	SC	Cd	Cr	Fe	Ni
Sunblock (n = 18)						
Rivaj Sunblock	India	S1	0.13 ± 0.0	0.31 ± 0.03	2.75 ± 0.32	7.34 ± 0.86
Neutrogena (SP525)	France	S2	0.12 ± 0.02	0.45 ± 0.02	2.44 ± 0.39	6.90 ± 0.1
Soltan	UK	S3	0.12 ± 0.03	0.43 ± 0.02	2.77 ± 0.45	6.93 ± 0.12
Sun care	Thailand	S4	0.14 ± 0.02	0.43 ± 0.0	2.30 ± 0.36	12.4 ± 0.12
Baby ganics sunscreen spray	USA	S5	0.12 ± 0.01	0.47 ± 0.03	2.31 ± 0.28	7.18 ± 0.48
Sunblock (SPF 60)	Pakistan	S6	0.16 ± 0.01	0.48 ± 0.0	2.57 ± 0.37	7.20 ± 0.15
		Max.	0.155	0.481	2.774	12.37
		Min.	0.121	0.309	2.298	6.900
		Mean	0.132	0.428	2.522	7.989
		SE	0.002	0.010	0.035	0.359

In 18 sunblock samples, Cr, Fe, and Cd levels varied insignificantly ($p < 0.05$). Korean market sunblocks showed lower Ni, Pb, Fe, Cr, and Cd levels.

Cosmetic products	No. of samples	Cd	Cr	Fe	Ni	Pb
Lotions	90	0.26 ±0.02	0.28 ±0.01	2.14 ± 0.07	3.0 ±0.1	2.81 ± 0.09
Hair dyes	18	0.06 ±0.01	0.09 ±0.01	0.31 ± 0.01	2.9 ±0.3	4.50 ± 0.34
Foundations	27	0.115 ± 0.003	0.24 ±0.004	9.6 ± 1.5	6.0 ±0.1	3.05 ± 0.09
Whitening Cream	18	0.123 ± 0.002	0.297 ± 0.003	2.2 ±0.1	6.23 ±0.04	3.25 ±0.09
Lipsticks	18	0.15 ±0.01	0.34 ±0.02	12.0 ± 1.8	6.64 ±0.03	4.49 ± 0.34

Sunblock creams exhibited the highest average concentrations of Cr, Ni, and Pb. Lipsticks and hair dyes followed in Pb content. Foundations had dominant Fe levels, while lotions showed the highest Pb concentration.

RECOMMENDATIONS:

1. Implement mass awareness programs on lead and cadmium toxicity, especially for vulnerable groups like children and pregnant women.
2. Regulatory bodies like FDA, NAFDAC, and SON should monitor cosmetics' import, production, and distribution.
3. Enforce quality control standards to limit lead content in cosmetics, ensuring product standardization.
4. Mandate clear labeling of heavy metal content on packaging for informed consumer decisions.
5. Require producers to include cautionary notices about toxic ingredient levels in cosmetics.
6. Establish an independent monitoring agency to test and publicly report heavy metal levels in cosmetic products regularly.

CONCLUSION:

Daily use of cosmetics containing harmful heavy metals like lead, mercury, cadmium, and others poses health risks. Sunblocks, followed by lipsticks, whitening creams, foundations, hair

dyes, and lotions, have high heavy metal concentrations. Nickel exposure may cause skin allergies, while lead exposure leads to serious health effects including cellular damage and carcinogenicity. Sunblocks showed highest average concentrations of Cr, Ni, and Pb, while lipsticks and lotions were dominant in Fe and Cd, respectively.

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