ORIGINAL ARTICLE

EFFECT OF LEAD ON THE SKIN AND HEALTH OF FEMALE DERMATITIS PATIENTS THROUGH COSMETICS

Hassan Imran Afridi[1], Asim Ali[2], Murk Bhatti[1], Ahsanullah Unar[3], Ghulam Qadir Chanihoon[1], Farah Naz Talpur[1], Tasneem Gul Kazi[1], Faisal Ali Arain[4]

[1]National Centre of Excellence in Analytical Chemistry, University of Sindh, Jamshoro, [2]Department of Biotechnology, COMSATS University, Abbottabad Campus-Pakistan, [3]School of life Sciences, University of Science and Technology of China, Haefei Anhui-China, [4]Nuclear Institute of Medicine and Radiotherapy, Jamshoro-Pakistan

Background: Cosmetics have been a part of routine body care not only for the upper classes but also for the middle and lower classes since the dawn of civilization. Cosmetic formulations are in more demand as the public's interest in skin whitening grows. The contamination of cosmetics with heavy metals is a major concern as they containing heavy metals and pose a major risk to human health. This study looks in to the effects of Lead on human skin. **Methods:** in this cross-sectional study different products were examined. The matrices (scalp hair, blood, serum and nails) of reference and dermatitis cosmetic female patients (seborrhoeic dermatitis, rosacea, allergic contact dermatitis, and irritant contact dermatitis) and cosmetic samples were used in a 2:1 mixture of HNO_3 (65%) and H_2O_2 (30%), and oxidation was performed using a microwave. The oxidized beauty and biological specimen underwent electrothermal atomic emission spectrophotometry after microwave-assisted acid digestion. The validity and precision of the methodology were verified using certified reference materials. Cosmetic products (lipstick, face powder, Eye Liner and Eye shadow) of different brands contain Pb concentrations in the ranges of 50.5–120 μg/g, 14.6–30.7 μg/g, 2.87–4.25 μg/g and 15.3–21.6 μg/g, respectively**. Results:** In the present study, cosmetic products (lipstick (N=15), face powder (N=13), eye liner (N=11), eye shadow (N=15) and female patients with dermatitis (N=252) residing in Hyderabad city, Sindh, Pakistan, was investigated. The outcome of this investigation showed significantly higher levels of Pb in biological samples (blood and scalp hair) of different types of female dermatitis patients than in reference subjects (p<0.001). **Conclusion:** The cosmetic products, especially with regard to heavy metals adulteration, are in use by the female population.

Keywords: Cosmetic Products; Female Dermatitis Patients; Electrothermal Atomic Absorption Spectroscopy; Lead; Blood; Blood Serum; Scalp Hair; Nail

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INTRODUCTION

Cosmetic products such as creams, beauty soaps, talcum and face powder, lotions, shampoos, hair oils, hair dyes, hair colours, perfumes, lipsticks, shaving creams, body lotions, nail vanish and polish have seen an increase in demand in recent years, resulting in huge development by the cosmetic industry.[1,2] Cosmetics are all materials that are used to clean and care for human skin. The aim of using cosmetics is to keep the body in good shape, protect it from the effects of the environment, and alter the appearance, aging process, and body odor.[3]

Any substances or cosmetic preparation proposed to come into contact through the exterior apparent of a person or the application of the epithelial layer of the tongue to the teeth also with the sole intention of protecting them and changing the way they look washing, body odour, and keeping the surface in good condition.[4,5]

A range of makeup includes glitter and makeup (used to colour the face), cream and granules (used to brighten the face and conceal defects to give the appearance of freshness and beauty), eye makeup and styling products (used to increase eyebrows), nail polish, and even lip gloss with lipstick (used for colour the fingernails and toenails). At the site of better awareness of the potential for toxic elements (lead, nickel, cadmium, cobalt chromium) to cause skin sensitivity, the influence of sensitization increases generally, especially for cadmium.[6] Since more people are aware of the potential of toxic elements (lead, nickel, cadmium, cobalt chromium) to cause skin sensitivity, sensitization to them is becoming more common, particularly for cadmium.[7] Each season, a slew of new cosmetics is introduced to the market. Any of these items may contain carcinogenic pollutants. It is difficult to keep any product on the path of protection.[8] Due to the interdependence of these variables (product

concentration, applied quantity of product, presence of penetration enhancers, and duration of the time remaining on the skin and emollients), it can be difficult to estimate the skin absorption of the beauty item's primary ingredient.[9]

Depending on the population, different heavy metal permissible limits of heavy metals apply (for example, children are more susceptible to heavy metal toxicity than adults). Soft tissue uptake of a particular ingredient in beauty products is complex and depends on a number of variables, as well as the accumulation in the item, the amount utilized, how long the commodity is left in the body, and whether the product contains emollients and infiltration boosters.[10] Evaluating heavy metal limitations in cosmetics simply on the basis of public health concerns is important due to this challenge and the dearth of well-designed skin absorption research that takes this into account.[11] At various stages of production, heavy metals have frequently been mistakenly added to toiletries as contaminants. The type of raw materials used in the manufacturing process, particularly the inclusion of additives and coloured minerals, could cause contamination. Furthermore, metallic contaminants may be included in the water used to make them.[12]

MATERIAL AND METHODS

Before starting the laboratory work, the research study was approved by the ethical review committee of Sindh University, Pakistan. Millipore was utilized to transfuse super water during the procedure (Milli-Q USA). Analytical grade chemicals made by E. Merck in Germany were utilized, along with nitric acid and hydrogen per oxide. Before use, all samples were examined for metal contamination. Standard solutions with 1000 ppm Pb (Fluka Kamika, Switzerland). HNO_3 solutions (0.2 mol/L) were used to dilute the solutions working standard (stock) in series. In polyethylene bottles, the solutions produced were stored in the refrigerator at 4 °C for subsequent investigation. The approved relevant data (CRM) of human hair BCR 397, blood, and Clinchek® human serum were purchased to achieve a sensitive and specific technique. After being submerged in 2 mol L-1 HNO3 for 24 hours, household items and equipment were washed and rinsed with Milli-Q water.

Dual-beam Pb was used by a Perkin-Elmer Model 700 Atomic Absorption Spectrometer (Norwalk, CT) equipped with an HGA muffle furnace, pyrocoated tungsten tubes, an AS-800 automatic selector, and a deuterium lantern to adjust for ambient noise. As a parabolic reflector, a PerkinElmer electric arc light was utilized under the current working conditions. In Table-1, the fundamental aspects are displayed. For the flame absorber phase, the output was the levels of the absorbing peaks, and for the muffle furnace, aggregated fluorescence intensity (peak area) was employed. In each case, 10 µl of the amount for the specimen or reference was inserted together with 10 µl of the modifying amount into the electrical heating tungsten evaporator. All modifiers and standards or calculated specimen portions were then placed in automatic sampler containers (cup). The samples were shaken using a parallel bottle electrically shaker (220/60 Hz, Gallenkamp, England). The (Osaka, Japan) PEL portable household oven programmed for and time necessary samples for processing was used to meet the time requirements for specimen digestion and heating rate from 100 to 900 W.

During a one-year period from January 2021 to December 2022, all samples were purchased from the commercial/local markets of Latifabad, Hyderabad, Pakistan, based on the availability of a total of 14 brands of eye shadow, 12 brands of face powder, 14 brands of lipstick and 10 brands of eye liner. After placing the samples separately in prewashed and dried plastic bags with the original packaging, they were stored at 4 °C until tested. After removing the wrappers, 5 composite samples were made by homogenizing the mixture of eye shadow, face powder, lipstick, and eyeliner brands. The preparation of these samples was carried out in a clean, net environment, with great care taken to avoid contamination. At 80 °C, all samples were dried. To grind the dehydrated samples, an agate crusher and pestle were used, and 125 m nylon mesh size sieve was performed before sample bottles were labeled and stored.

The biological samples of patients with different types of dermatitis (N-252) were collected from the Liaquat University of Medical and Health Sciences (LUMHS) Hyderabad, Pakistan (Table-2). All study procedures were approved by the ethics councils of the institutions and the NCEAC of the University of Sindh - Jamshoro before the acquisition of test data and samples. The authors conducted one-on-one interviews with each patient and a reference. They were also given the survey and asked to complete and were legally allowed to take part when signing the consent forms. However, participants completed a full *pro forma* and signed it, including their ethnic background, food preferences, family background, etc. In this form is included the necessary information about physical characteristics, racial background, health, diet choices, age, assent, and the type of disease is included in this form. According to their categories, female psoriasis individuals are divided into groups. The period of consumption of alcohol, as well as any physiological

disease (such as hypertension, diabetes mellitus, and others), were the exclusion criteria. Table-3 provides the demographic data.

Therefore, the specimens of 102 female referents were selected as referents. Referents met the inclusion requirements by not having any disease, not using any supplements for the previous six months, and sharing the same age, lifestyle, and socioeconomic level. The exclusion criteria for the reference participants were the same as those for female patients with dermatitis. The referents underwent medical examinations prior to collecting biological samples.

A practicing nurse collected blood (10 mL) from patients and referees undergoing venipuncture in metal-free safety Vacutainer blood collection tubes (Becton, Dickinson and Company, Rutherford, NJ, USA) containing K2EDTA (>1.5 mg). Careful attention was paid to avoid metal contamination according to the requirements of the Clinical and Laboratory Standards when collecting the samples and storing them at -20 °C until further analysis.[13] The facility's pathology facilities received approximately 5 ml of clinical specimens for standard biochemical analysis. Using stainless steel blades, the samples (0.5 g, varying from 1 to 2.0 cm in length) were taken from the back of the head by the dermatological subject as female references. Before and after the individual hairstyle, the scissors were thoroughly cleaned with alcohol swabs. Individual sterile plastic bags containing each piece of scalp hair were labelled with the user's personal identification number. Nail samples was necessary for the female referents and dermatitis. Referents and those with dermatitis thoroughly cleaned their fingers and feet with prescription soap before being rinsed with dual water to minimize the rate of corrosion and dried with a paper towel or napkin to remove any external contamination. Stainless steel scissors were used to trim the fingernails.

For elemental analysis, triplicates of each sample were made using a cooking technique. Directly taken into flasks were six replication samples of certified reference materials (human hair and blood), as well as triplicates of all references and individuals with various forms of eczema (50 mL capacity). Digestion was carried out by combining 1 ml of freshly made H2O2-HNO3 mixture (1:2, v/v) with 200 mg of hair, 100 mg of nail, and 0.2 mL of blood and serum samples in PTFE flasks. Once the samples had been digested, the flasks were placed in the microwave for 3 minutes at 900 W. When the bottle comprising, the digestive samples reached room temperature, a bucket of water was used to dilute it. These samples were subjected to an ETAAS analysis for Pb. The same process was used to prepare the blank samples.

With the aid of various statistical software pieces, the entire statistical information set is utilized (Minitab and Excel X state). Averages and standard deviations were calculated to describe every sample and the facts from its triplicate sections. By applying Student's t test, it was possible to empirically determine Pb levels and their massive difference. Using an unmatched two-sample t test, substantial differences were tracked in several clinical materials from referents and dermatitis sufferers. A significant difference was defined as $p \leq 0.05$.

Several Pb references were used for measurement. The slope factor of the calibration curves was used to calculate the sensitivity (m). The expression of the calibration curve (n=5) is shown below.

$$Y = 2.35\times10^{-3}\,(Pb) + 1.05\times10^{-4},\ r=0{:}999$$

where Y is the integrated absorbance, r is the Cd regression and the concentration range for the calibration curve reached from the detection limits to 100 μg/L. Limits of detection (LOD) and limits of quantitation (LOQs) were specified. The slope was determined for the evaluation of the ferro-elemental analysis analyser, where s is the variance for the ten observations of a blank reagent and m is taken into consideration for the calibration curve. The LOQ and LOD values for cadmium were determined to be 0.64 g/g and 0.18 g/g, respectively.[14]

Human hair CRM 397 and Clincheck® control lyophilized human complete bloodstream were used to evaluate the efficacy of our approach (Table-4). Less than 10 minutes were needed to complete the digestion of the materials and it took less time. The difference between the average Pb levels and the certified results was less than 2%. The discrepancy between the value calculated using the MWD approach and the validated values was not significant (paired t test, $p>0.05$).

RESULTS

An analysis of numerous samples of each unique cosmetic product was performed. In the eye liner, the Pb levels were determined to range from 50.5 to 120 g -1. Pb levels were found in face powder and lipstick brands in the ranges of 14.6–30.7 and 15.3–21.7 g - 1, respectively. However, the variation in Pb in the different liner items was also found to be 2.87–4.25 g/g1 (Table-5).

Female eczema sufferers and normal referents shared the same diet practices, economic background, and residential locations. Healthy and various patients with dermatitis disclosed that they had been using face powder, lipstick, eye liner, and eye shadow for beauty for approximately 12.4–1.65 years.[15] Close relatives of the patients served as referents. The clinical characteristics and fundamental medical information were extracted from medical records with the help of paramedical professionals. According to the work-related background (jobs held over a period of more than one year) included in the investigation, 68% of Dermatitis patients and referents were normally housewives, 22% had been employed as teachers in schools and colleges, and 10% were employed in the private sector. Twenty percent of

the 252 female dermatitis patients used Blusher, Mascara, Eye Makeup and Styling Products, compared to 80% of the patients who used these cosmetics. Both referents and patients with dermatitis had to meet the procedure of being smokers or drinkers. The levels of Pb in female dermatitis patients (irritant contact dermatitis, Rosacea, Seborrhoeic dermatitis and allergic contact dermatitis) vs obtained Pb values obtained in biological specimens of healthy referents are mentioned in Table-6.

The Pb was significantly higher in biological samples (scalp hair, nail, blood, serum) from female dermatitis patients than in healthy referents (p<0.001). The Pb range in scalp hair samples of female referents of two age groups (16–35) & (36–50) were found to be in 95% confidence intervals (CI: 2.01–5.44 & CI: 5.76–6.22) ug g^{-1} were extensively lower in dermatitis patients compared to those who consumed different cosmetic products of cosmetic (p<0.001) (Table-6). The levels of Pb in blood and serum samples of different types of dermatitis patients (rosacea, allergic contact dermatitis, irritant contact dermatitis and seborrhoeic dermatitis) in the two age groups (16–35 and 36–50 years) were found to be higher than those in healthy females (1.03–1.50 and 1.18–1.80 µg l^{-1}) of the two age groups 16–35 and 36–50 (p<0.001) (Table-6). The Pb concentrations in nail samples from female referents of both age groups (16–35) and (36–50) were found to be lower at 95% (CI: 2.34–2.67 and CI: 3.08–3.47) µg $g^{-1,}$ respectively, than the Pb concentrations found in different types of dermatitis patients (Table-6).

Table-1: Measurement conditions of Lead in electro atomic absorption spectrometer A. Analyst 700.

Parameters	Lead
Lamp current (mA)	8.0
Wave length (nm)	283.3
Slit width (nm)	0.7
Drying Temp (ºC)/ramp hold (s)	140/15/5
Ashing Temp (ºC)/ramp hold (s)	700/10/20
Atomization Temp (ºC)/ramp hold (s)	1800/0/5.
Cleaning Temp (ºC)/ramp hold (s)	2600/1/3
Chemical Modifier	5µg Pd as Mg (NO_3)

Sample volume (10µl), Cuvette = Cup, Carrier gas = (200 ml/min), Background correction (D2 Lamp)

Table-2: Complete Demographic description of female referent and different types of dermatitis patients

Age groups (years)	Healthy	Dermatitis patients			
		Rosacea	Allergic Contact Dermatitis	Irritant Contact Dermatitis	Seborrhoeic Dermatitis
16-35	56	36	31	35	29
36-50	46	32	29	33	27
Sub Total		68	60	68	56
	102	252			

Table-3: Biochemical parameters of female referents, and different types of skin disease patients

Parameters	Normal range	Healthy Subjects	Dermatitis patients			
			Rosacea	Allergic contact dermatitis	Irritant contact dermatitis	Seborrhoeic dermatitis
16-35 years						
Weight (kg)		57.9±2.95	57.5±3.17	57.5±2.65	57.7±1.85	57.6±0.96
Height (cm)		158.6±1.62	159.3±1.50	159.0±1.71	158.8±2.54	158.3±1.55
BMI (kg/m^2)		23.0± 1.08	22.7± 2.07	22.7± 1.59	22.8± 1.92	22.9± 1.47
Haemoglobin (mg/dL)	10.5–13.2	11.7±0.49	11.5±0.60	11.9±0.44	12.0±0.35	11.6±0.30
Haematocrit (%)	35–55	45.5±1.59	46.9±1.25	44.6±1.39	44.9±1.68	44.7±1.28
Red blood count RBC (mm^3)	3.5–5.5	4.05±0.27	3.82±0.35	3.75±0.29	3.97±0.24	3.82±0.27
WBC (mm^3)	3.5–10	7.95±0.45	7.80±0.48	7.69±0.39	7.85±0.41	7.76±0.52
Platelets (K/mm^3)	100 - 400	305 ± 9.85	293 ± 10.9	289 ± 14.5	309 ± 13.8	280 ± 9.95
Creatinine (mg/dl)	0.6–1.3	0.85±0.15	0.86±0.22	0.89±0.19	0.87±0.14	0.91±0.20
36-50 years						
Weight (kg)		65.7±2.03	67.8±2.83	65.9±1.50	66.3±2.52	67.4±1.92
Height (cm)		158.7±1.09	158.9±1.50	158.6±1.71	158.9±2.54	158.7±0.85
BMI (kg/m^2)		26.1± 1.61	26.8± 1.73	26.2± 2.05	26.2± 1.73	26.8± 1.15
Haemoglobin (mg/dL)	10.5–13.2	12.6±0.86	12.8±0.54	13.0±0.72	12.9±0.82	12.7±0.95
Haematocrit (%)	35–55	44.9±2.06	43.7±2.53	45.2±1.98	44.6±2.15	45.0±2.63
Red blood count RBC (mm^3)	3.5–5.5	4.59±0.37	4.19±0.48	4.26±0.35	4.33±0.46	4.42±0.40
WBC (mm^3)	3.5–10	318 ± 12.5	299 ± 13.6	293 ± 16.2	305 ± 10.5	267 ± 10.3
Platelets (K/mm^3)	100 - 400	7.59±0.62	7.72±0.45	7.65±0.49	7.62±0.37	7.69±0.59
Creatinine (mg/dl)	0.6–1.3	1.05±0.13	1.15±0.18	1.24±0.12	1.17±0.17	1.13±0.22

Table-4: Validation of method for Pb determination in certified reference materials (CRMs) samples

Certified values	Microwave Digestion method (MWD)	$T_{calculated}$ ^	% Recovery[b]
CRM of whole blood (µg /1)			
105±24	104.2±7.36 (6.95)	0.0519	98.2
CRM of human hair (µg/ g)			
33±1.2	32.6±1.20 (3.68)	0.096	97.6
CRM of serum (µg /1)			
1.53 ± 0.11	1.52 ± 0.08 (5.26)	0.521	99.3

^Paired t-test between Certified Value and MWD, Degree of freedom (DF) = n-1= 6-1= 5,
T (critical) at 95 % CI = 2.57, p<0.50
Values in ( ) are %RSD
[b] % recovery was calculated according to: ([MWD])/([Certified Value]) x 100

Table 5: - Lead concentrations in different types of cosmetic samples

Eye Shadow		Face powder Brands		Lipstick		Eye Linear	
Morphei	63.7±2.15	L'Oreal pairs	17.3±3.6	Medora	20.9±3.7	M.A.C cake	3.15±0.23
Sweat Touch	80.5±5.20	New York Coour	14.6±2.4	LOreal	15.5±2.47	Botanic cake	3.45±0.63
Maybelline eye shadow high pearls	106±9.27	D Ganish	20.7±3.8	Rivaj	18.3±1.79	Maybelline Gel	4.09±0.21
E.L.F eye shadow	95.6±6.35	Glamours	24.5±4.24	Nars	21.6±1.20	E.L.Ff cream	3.17±0.15
Urban Decay	78.6±8.26	Etude	27.6±5.16	Lakme	19.3±1.05	kryolan	2.87±0.19
L'Oreal eye shadow	90±9.50	ELF	20.4±6.28	Becute	21.7±1.02	Medora pencil	3.34±0.21
Cover Girl Eye shadow	120±11.5	sweat touch twin cake face powder	26.9±5.62	Revlon	18.3±1.52	Body shop carbon eye definer	3.60±0.31
Lancome eye shadow	80.2±7.50	Clinque	30.7±4.28	MAC cosmetics	19.9±2.06	Rivaj pencil linear	4.09±0.21
Dior eye shadow	65.7±7.30	Maybelline matifying powder	19.3±1.29	Yeves sain lausehia	20.6±1.82	sweat touch pencil	4.25±0.14
Mac	92.6±8.51	Rimmel London	17.3±3.70	Dior	19.6±2.06	Christin cake	3.15±0.23
Etude	117±13.6	Diana of London	23.5±3.08	Clinique	20.5±1.28	Glamours cake	3.60±0.41
Revlon	86.3±8.62	CoverGirl face powder	25.3± 1.65	Maybelline	17.9±0.96		
Maybelline	60.9±5.80	Makeup Revolution London	20.5±3.55	Orifalme	20.9±1.35		
Oriflme	50.5±9.05			Etude	16.3±0.90		
Clinque	79.6±7.96			Guerlain	15.3±0.72		

Table-6: Lead concentrations in the biological samples of female referents and different types of dermatitis patients

Biological specimens	Age Groups	Referent	Dermatitis patients			
			Seborrhoeic dermatitis	Rosacea	Allergic contact dermatitis	Irritant contact dermatitis
Scalp hair (µg/g)	16-35	5.23±0.42	8.15±0.90	9.60±0.75	9.20±0.60	8.95±0.82
	36-50	6.02±0.58	10.9±0.81	11.3±1.22	10.7±0.82	7.94±0.36
Blood (µg/l)	16-35	153±10.7	283±19.0	296± 25.9	286±12.9	270±19.5
	36-50	180±12.5	315±21.9	326± 30.5	319±16.5	292±20.5
Serum (µg/l)	16-35	3.79±0.21	8.90±0.37	9.07±0.50	8.52±0.72	9.33±0.52
	36-50	4.17± 0.35	9.55±0.40	9.41±0.36	9.73±0.91	9.70±0.60
Nails	16-35	2.49±0.35	6.59±0.62	6.98±0.44	7.35±0.65	7.05±0.48
	36-50	3.30±0.40	7.95±0.78	7.57±0.75	7.82±0.70	7.65±0.52

DISCUSSION

The purpose of this cross-sectional study was to determine the amount of exposure to lead from different types of makeup cosmetics and their impact on biological specimens such as scalp hair, serum, blood and nails of female dermatitis patients compared to a healthy female referent. The amount of lead was determined in various types of eye shadow, face powder brands, lipstick, and eye linear samples ingested by various types of female referents and female dermatitis patients. The lead concentrations in biological samples from female referents, as well as in various types of dermatitis patients, varied according to the types of cosmetology.

The basic components of beauty cosmetic products commonly include compounds of different elements, which are added to these cosmetic products to obtain a better effect on the skin. Elements in excess may be present as impurities. Dermal exposure is the main route of heavy elemental toxicity because many cosmetic products are applied directly to the epidermis (top layer) of the skin. On the contrary, oral exposure can occur from the application of cosmetic products, which contain

heavy elemental impurities, around the mouth or from hand-to-mouth contact.16 Whenever heavy metals, such as carboxylic acid (-COOH), amine ($-NH_2$), and thiol (-SH) of proteins, come into contact with a person's body, they can induce cell malfunction or loss, which can then result in a variety of disorders.[17]

The two methods have a negative impact on the skin layer. The first is complexing or coupling of free Pb ions with cysteine sulfhydryl radicals in epidermal keratins, and the second is the induction of Pb into the metallothionein. According to studies, the skin could absorb 0.5% of Pb, which is an extremely low quantity, in certain circumstances where the skin would be exposed to concentrated forms for a long period of time.[18]

In the environment, lead is one of the most toxic metals and is present in water, air, and dietary food. Perhaps the most significant threat is the continuous absorption of lead. Prolonged exposure to Pb is associated with anaemia, renal disease, osteotoxicities, hepatocellular carcinoma, and cancer in numerous parts of the body. The dermal mechanism is used for the accumulation and assimilation of these components through face creams.[19] In the mucus layer, some particles, such as cadmium, nickel, cobalt, and chromium, are absorbed or deposited.[20]

Metals in higher concentrations, including aluminium, lead, cadmium, and mercury, penetrate the epidermal layer or are absorbed into the circulation. These substances cause toxicity when they are deposited in the blood in several organs.[21] The increasing amounts of toxic metals found in the blood, urine, and vital tissues (kidney, heart, and intestine) of elevated cosmetic users support the theory that these metals are absorbed through the skin or come into accidental contact with people who use the skin on a regular basis, which supports this theory.[22]

The absorption of toxic elements via the skin is less efficient than that through the gastrointestinal tract or inhalation. Some toxic elements (As, Cd, Pb, Ni) enter the human body through skin routes as a result of the use of cosmetics. With long-term usage of cosmetic products, the chemicals present in cosmetic products may deposit in the third and bottom layers of the skin (subcutaneous fat). Despite the fact that ingestion of these toxicants occurs through the epidermal layer compared to the respiratory and gastrointestinal tract, our epidermis is less effective. Due to the extensive use of certain face creams, a small quantity of them can enter the body in this way.

The strengths of the study are that specimens were handled with care and rigor to ensure minimum bias in data collection and its examination both at laboratory level and statistical analysis. The limitations are that the design is cross sectional. An analytical and preferably ethically sustainable experimental design would be a better option.

CONCLUSION

The Pb concentrations in the different types of cosmetic products are estimated to be higher than the respective maximum allowable concentrations. It is concluded that the documented reports are cases of different types of female dermatitis caused by the toxicity of transition heavy elements in beauty cosmetics products. These cosmetic products have toxic elemental levels higher than the reported value. The long-term use of these cosmetics products indicates the possibility of negative health impacts. Therefore, suitable measures, including in particular the setting of limits of amount while they are missing until today in addition to ordinary management of raw materials, order of cosmetics manufacturing & the last item, are compulsory. This is the most important finding, because cosmetic items are used daily throughout the world. In addition to women and men, infants, and seniors use the service. In older people, the skin is very sensitive to the absorption of toxic elements, although cosmetic products are more susceptible to their toxic action. Socioeconomic factors were also monitored to play an important role in the risk of dermatitis, for example irregular screening, poor or fast-food nutrition, late finding and unbalanced contact with health caution. Cosmetic products are carefully measured as a possible source of toxic elemental exposure. Cosmetics must be taken into consideration as potential causal variables in Pb poisoning cases where the history of the disease does not show signs of exposure to hazardous elements at work and outdoor settings. To increase the safety of these widely used cosmetic items, Pb levels in cosmetic products must be reduced.

AUTHORS' CONTRIBUTION

HIA and TGK made project and took part in designing the study, clinical diagnosis, selecting patients, and made file of each selected subjects. In addition, writing the manuscript. MB, and FNT were participating in biological sample collection and analysis through atomic absorption spectrophotometer. FNT, AU and JAB, took part in statistically calculating the data as well as proof reading and correction of language.

Declaration of Competing Interest:

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Address for Correspondence:

Hassan Imran Afridi, National Centre of Excellence in Analytical Chemistry, University of Sindh, Jamshoro, Pakistan
Cell: +92 331 661 1761
Email: hassanimranafridi@yahoo.com