

SHORT REVIEW ON COSMETIC AIR POLLUTANTS

Sayed Altaf Ahmed¹, Syed Mohammed Shoaib², Shaik Abdul Khader Jilani³ H Aleem Basha¹ and Anil Kumar Chaudhary³

¹Department of Physics, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad-500 032
Telangana State., India.

²Applied Physics Lab, School of Technology, MANUU Polytechnic Kadapa Satellite Campus, Maulana Azad National Urdu University, Gachibowli, Hyderabad-500 032, T.S., India

³Department of Electronics and Communication Engineering Dr. K V Subba Reddy Institute of Technology, Opp Dupadu Railway Station, Lakshmipuram Post, Kurnool-518218 Andhra Pradesh., India.

⁴Advance Centre of Research in High Energy Materials University of Hyderabad-500 046, Telangana State., India.

ABSTRACT

Everyone wants to be good looking, handsome, pretty, beautiful. To become fair we use cosmetic, skin cares. Now a days in trends we avail different cosmetics for different purposes. Skincare, hair care, hygiene care, fragrances, color cosmetics, makeup cosmetics, daily routine cosmetics and face care are sub classes of cosmetic divisions. These cosmetics can be made by animal ingredients, paraben, animal cruelty, impurities, wax, artificial colors, and alcohol. This causes harmful effects on our human health. For instant result we use cosmetics which having highly concentrated chemicals, harsh chemicals, impurities, alcohols, ammonia, sulphate etc., By using these cosmetics our skin damaged seriously.

Cosmetic products are also play a lead role in producing air pollution, water pollution, sea pollution and soil pollution. The World-wide cosmetic market has 380.2 billion dollars in 2019 and it is expected 463.5 billion in dollar in 2027 and still it is grown continuously [1]. In this Short Review Article, we correlate the Cosmetic Air Pollutants with Human Respiratory system and its diseases. To overcome cosmetic pollution, we have to turn for natural remedies. Avoiding using plastic bottles, tubes, and polyethene's to avoid the pollution by cosmetics. Using harmful chemical contain cosmetics, we face allergic, irritation, nasal irritant, pimples on face, wrinkles on skin in early age, dark spots, sunlight irritation, skin pigmentation these outcomes are seriously recorded.

Keywords: Skin Allergy, Cosmetics Chemicals, Air pollution and Cosmetic Pollutants by Cosmetics

1. INTRODUCTION

Now a days Cosmetics as personal care products are part of life even though they are harmful and toxigenic to us. Carcinogens, pesticides, reproductive toxics, endocrine disruptors, plasticizers, degreasers, kojic acid, surfactants and industrial chemicals are used as most of the cosmetic ingredients. The European Union (EU) declared that a material or compound deliberate to be place in touch with visible parts of human body is known as beauty products and these beauty products influenced epidermis, hair system, nails, lips, and external genital organs including the teeth and the mucous membranes of the oral cavity. [1] One of the study states that approximately 12 cosmetic products composed of 168 chemical ingredients were used by the women in USA. As demand is increasing in cosmetics more than 70,000 chemical are used daily in producing the cosmetics world wide and thousands of new chemicals being launched every year. [2] Commonly there are four types of malignant melanoma: they are (a) Superficial spreading malignant melanoma, (b) nodular melanoma (c) lentigo maligna melanoma (d) acral lentiginous melanoma. These are having different properties for example (a) category melanoma appears 70% in both men and women and it may grow wherever on the body but it seems to be appeared on upper back of men and women and on the legs of the women. (b) category melanoma appears 15-30% dermis from the genesis with no apparent horizontal grown phase. (c) category melanoma fall in 4-10% of all melanomas. [3] (d) category melanoma happens 2-8% of all melanomas on the palm of the hand, sole of foot, plane surfaces etc., [4] Beauty care-based melanoma normally effects on the palms, soles and under fingernails or toenails of men and women. [5]

Over the past 50 years, It is found that chemical ingredients of cosmetics have badly affect on hormones in the human body which gives feedback of endocrine system and causes upset of endocrine system which leads to a number of endocrine abnormalities such as breast, prostate and testicular cancers, diabetes, obesity, and reproductive problems.[6] The skin care products that stick on the skin: “stay-on” or “leave-on” products such as moisturizing and cleansing creams, lotions, milks, tonics, etc etc., fur cosmetics (notably hair dyes), nail cosmetics (nail varnish), deodorants and other perfumes, and facial and eye make-up products are responsible for most allergic reactions. [7-9] Soap, Shampoo, Bath Foam, and Shower Foam are less generally brought out or induce contact allergic reactions. This phenomenon illustrated by the infusion of the product. However, a deviation to this common rule was allergy to a surface-active agent cocamidopropyl betaine which caused response to shampoo in customer and occupational inflammation in hairdressers and to bath gels. [10-12]

MATERIALS AND METHODS:

The word ‘cosmetic’ extract from the Greek term “Kosm tikos” which means having Skill to manage, expert in decoration, to provide ‘kosmein’ to furnish and ‘kosmos’ order balancing. [13] The term “cosmeceutics” (or active cosmetics) was popularized by the dermatologist Albert Kligman in the 1980s. Enough literature survey has been studied for this review article. Through this study we are able to

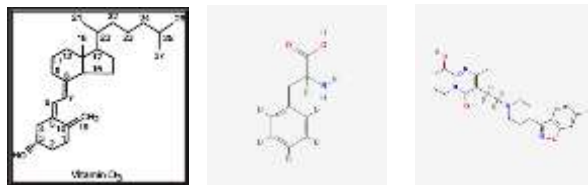
understand the chemical ingredients of cosmetics including epidemiological studies addressing risk factors of different diseases and infections from the past 20 years (2000–2020). Both Human and Animal studies were preferred in vitro experiments. However, lot of in vitro cosmetic studies conducted on animals but on human these studies were lack behind. Scientific learning was done through various search engines like Scopus, Science Direct, Web database, Google Scholar and PubMed etc., Theory behind the literature, principle, and directive were acquired from reviews and reports of the National European Union, World Health Organization, Web pages, and Various Online Textbooks. European Union perform lot of debates and meetings on Cosmetics in Scientific Communities so EU reports were preferred in this current review. This review gives complete a story line of harmful effect of cosmetic on different organs of human body.

The regular and direct exposure to chemical ingredients presents in cosmetics causes many health problems to the customers. The transcutaneous absorption of irritants and allergens of dermal skin was due to the excess use of cosmetic ingredients such as surfactants, foam agents, fragrances, thickeners, minerals, metals, and preservatives which have synthetic origin. The various case studies, reviews give the feedback of chemical reactions of generally used cosmetics and assess ill effects of cosmetics. The main aim of the present review is to differentiate various cosmetic beauty products, general effect of cosmetics on human metabolism and the rate of dermal absorption. (1) Maintenance in Good Condition; (2) Change in appearance; (3) protection; and (4) correction of body odor are the main four functions of Cosmetics in the face-to-face treatment of the visible surface of human body. [14,15]. However, the term cosmeceutics controversial in the case of retinol, certain bleaching agents, etc.). There are many types of Cosmetics which causes adverse effect on human beings. Few of them category wise are mentioned below (1) cosmetics for personal hygiene (soaps, deodorants, shampoos); (2) cosmetics for the dermis, hairpiece, and integument care (toothpastes, products for external intimate care); (3) cosmetics for beautification (perfumes, lip colors); (4) shield cosmetics (solar products, anti-wrinkle products); (5) therapeutic cosmetics (beauty masks, hair dyes); (6) perpetuation cosmetics (shaving cream, moisturizing creams); and (7) dynamic cosmetics (fluoridated toothpastes, antiseptics). [16,17].

RESULTS AND DISCUSSION:

All the cosmetic adverse results which are available in literature were analysed. It is reported that interrupting the normal mechanism of hormones, irregular metabolism and biomechanics of human beings was due to excess use of beauty cares and harsh chemical containing cosmetics [18]

The different kinds of endocrine disrupting chemicals so far reported as fallows [19] (a) Parabens in Cosmetics (b) UV- Sunlight Obstacles like benzophenone-1, benzophenone-3 and octinoxate, [20-22] (c) synthetic musks and fragrances (deo, perfumes, attars etc.,) (d) Antimicrobials like triclosan, cyclosiloxanes octamethylcyclotetrasiloxane(D4), bisphenol-A (BPA), decamethylcyclopentasiloxane (D5), and dodecamethylcyclohexasiloxane(D6). (e) Alkylphenols like nonylphenols and octyl phenol, and glycol ethers.[23]



The different kinds of endocrine disrupting chemicals so far reported are Parabens [19], UV-filters such as benzophenone-1, benzophenone-3 and octinoxate, [20-22] synthetic musks and other fragrance compounds, antimicrobials such as triclosan, bisphenol-A (BPA) cyclosiloxanes octamethylcyclotetrasiloxane(D4), decamethylcyclopentasiloxane (D5), and dodecamethylcyclohexasiloxane(D6), alkylphenols such as nonylphenols and octylphenol, and glycol ethers.[23]

Action plan of Endocrine Disruption: The effect of different cosmetic ingredients has different action on different hormones of the human body. These are primarily responsible for aromatase binding on specific proteins. Protein play role of transportation (sodium/iodide symporter) or a carrier agent protein (cortisol binding protein). This cosmetic barricade the hormones synthetics which gives out comes in contrast of specific hormone. [24] Through this cosmetic chemical the main endocrine system estrogenic, androgen, and thyroid can be changed. [25]. This Cosmetic chemical can establish a bond with some parts of DNA which regulates the growth of gene mechanism. [26] However this binding process of steroid hormones happens in both membrane and nuclear receptors. [27]. Lipophilic chemicals (xenobiotics) disturb the downstream gene expression and very much bonded to nuclear receptors. Few cosmetic chemicals have altered the normal action of estrogens and androgen ligands. Some nonsteroid receptors like neurotransmitter receptors (serotonin, dopamine, and norepinephrine); are also play a vital role in influencing the cosmetic chemicals. However, the effect of steroid biosynthesis metabolism due to orphan receptors like aryl hydrocarbon receptors and enzymatic routes was also explained. Paraben is common prominent chemical ingredient present in Cosmetic products. This paraben is responsible for reproductive abnormalities like it reduces sperm reproduction and reactions on testosterone concentrations.[28] Phthalates which act as coherent agent to skin, hair, nails, and increase their hold on capacity are most frequently used salts or esters of phthalic acid in cosmetics. Phthalates containing cosmetics severely effected to sperm counts.[29] Hypospadias is a physical birth deformity of penis. Regularly use of cosmetic products containing phthalates leads to Hypospadias. At present 30-40 hypospadias cases per 10, 000 births were reported. [30] In cosmetics Aluminum Compound is toxic compound which leads to Alzheimer's disease and also breast cancer. Triclosan is an important ingredient of most cosmetic beauty care products. It is harmful and damages the skin cells. [31] Detergent ingredients of cosmetic products like Sodium Lauryl Sulfate (SLS) is very harmful for brain, heart and liver cells. Propylene Glycol (PG) is an important cosmetic ingredient used in beauty care products like creams, cleansers, make up, lipsticks, baby products etc. responsible for kidney and liver problems, dermatitis, and ototoxicity compound. [32] Alpha-hydroxy Acids are frequently used in cosmetic beauty products like skin toner, face cleansers, face sheet masks, age wrinkle removers, serums, moisturizing creams, are responsible for creation of oxidants through skin cells which causing skin cancer and skin pigmentation. Formaldehyde compound is most common ingredients used in creams, soaps, nail polishes, and shampoos which causes several allergic

reactions which causes to asthma, and bronchospasm. [33] Talc is made up of magnesium which used in makeup and body powders. It causes Ovarian Cancer. [34]

CONCLUSIONS:

The use of Cosmetic enhances day by day in daily life and it capture billion of rupees in markets capital. Very less research has been done in this cosmetic field. We have to focus in Research & Development field in such cosmetics which are not harmful to human health nor causes environmental pollution. However, some cosmetic companies came forward with halal certification, paraben free, alcohol free, purely vegan products and safe for human health. From this short review it is clear that Cosmetic ingredients like parabens, phthalates, hypospadias, aluminum compounds, triclosan, sodium lauryl sulfate (SLS), propylene glycol alpha hydroxy acids, formaldehyde, caffeine, alcohol, ammonia, are not safe to the human health, which causes several dangerous effects on skin, liver, reproductive mechanism, and human immunity system. From this study we conclude that cosmetics are not safe to use and its most of ingredients are not certified by CIR. The cosmetic air pollutants in beauty salons also affects the human health aspects particularly respiratory/lung system. The large consumption of cosmetic and their chemical ingredients badly effect on the environment and it should not be under estimated. Finally, the details about the environmental influence of cosmetic on their covering could inspires the purchaser to engage a more responsible and informed use of these by products. The cosmetic preservation was done through the antimicrobial efficacy. However, the inherent toxicity present in the ingredients of cosmetics is challenging task for microbiologists.

ACKNOWLEDGMENT:

The Author is thankful to our Honourable Vice Chancellor **Prof. Syed Ainul Hasan** for the encouragement of R &D activities in our MANUU Central University **Prof. Salman** (DEAN and Board of Studies Chairman, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad, T.S., India) **Dr. Mubashir Azam** (Radiation Safety Officer RIMS Kadapa, A.P., India) **Dr. Khaja Moinuddin** (Assistant Professor of Microbiology, RIMS Kadapa, A.P., India) for assisting in discussion and the fruitful conclusion.

REFERENCES:

1. European Commission (EC). Glossary; 2013. Available from: http://www.ec.europa.eu/consumers/sectors/cosmetics/glossary/index_en.htm. [Last updated on 2013 Jan 03].
2. Hill A. Make-Up Kits Holds Hidden Danger of Cancer. USA: Observer Magazine; 2002. p. 13.
3. Diamanti-Kandarakis E, Bourguignon JP, Giudice LC, Hauser R, Prins GS, Soto AM, et al. Endocrine-disrupting chemicals: An endocrine society scientific statement. *Endocr Rev* 2009; 30:293-342.
4. Govindarajan B, Bai X, Cohen C, Zhong H, Kilroy S, Louis G, et al. Malignant transformation of melanocytes to melanoma by constitutive activation of mitogen-activated protein kinase kinase (MAPKK) signaling. *J Biol Chem* 2003; 278:9790-5.
5. Brenner S, Mashiah J. Malignant melanoma: It pays to be a woman. *Skinmed* 2003; 2:183-7

6. De Coster S, van Larebeke N. Endocrine-disrupting chemicals: Associated disorders and mechanisms of action. *J Environ Public Health* 2012; 2012:713696.
7. de Groot AC, Weyland JW, Nater JP (1994) Unwanted effects of cosmetics edn. Elsevier, Amsterdam, the Netherlands
8. de Groot AC, Frosch PJ (1997) Adverse reactions to fragrances. A clinical review. *Co*
9. de Groot AC, Bruynzeel DP, Bos JD, van der Meeren HLM, nact *Dermatitis* 36: 57–86 and drugs used in dermatology, 3rd van Joost T, Jagtman BA, Weyland JW (1988) The allergens in cosmetics. *Arch Dermatol* 124: 1525–1529
10. de Groot AC (1997) Cocamidopropyl betaine: a “new” important cosmetic allergen. *Dermatosen* 45: 60–63
11. de Groot AC, van der Walle HB, Weyland JW (1995) Contact allergy to cocamidopropyl betaine. *Contact Dermatitis* 33: 419–22
12. de Groot AC (1997) Contact allergens – what’s new? *Cosmetic dermatitis. Clin Dermatol* 15: 485–492
13. Butler, H. Microbiological control of cosmetics. In *Poucher’s Perfumes, Cosmetics and Soaps*; Butler, H., Ed.; Springer: Dordrecht, The Netherlands, 1993; Volume 3, pp. 572–606.
14. Siemer, E. Preparations for cleansing and caring for blemished skin. In *Cosmetics and Toiletries—Development, Production and Use*; Umbach, W., Ed.; Ellis Horwood: New York, NY, USA, 1991; pp. 124–128.
15. Shai, A.; Baran, R.; Maibach, H.I. (Eds.) *Cosmetics and Cosmetic Preparations: Basic Definitions*; Informa UK Ltd.: London, UK, 2009; pp. 1–3.
16. The European Parliament and the Council of the European Union. Regulation (EC) No. 1223/2009 of the European parliament and of the council of 30 November 2009 on cosmetic products. *Off. J. Eur. Union L* 2009, 342, 59.
17. Barel, A.O.; Paye, M.; Maibach, H.I. *Handbook of Cosmetic Science and Technology*; Taylor & Francis Group: Boca Raton, FL, USA, 2006.
18. Regulation of the European Parliament and of the Council on Cosmetic Products 1223/2009/EC; 2009.
19. Dodson RE, Nishioka M, Standley LJ, Perovich LJ, Brody JG, Rudel RA, et al. Endocrine disruptors and asthma-associated chemicals in consumer products. *Environ Health Perspect* 2012;120:935-43.
20. Situm M, Buljan M, Bulić SO, Simić D. The mechanisms of UV radiation in the development of malignant melanoma. *Coll Antropol* 2007;31 Suppl 1:13-6
21. Witorsch RJ, Thomas JA. Personal care products and endocrine disruption: A critical review of the literature. *Crit Rev Toxicol* 2010;40 Suppl 3:1-30.
22. Krause M, Klit A, Blomberg Jensen M, Søbørg T, Frederiksen H, Schlumpf M, et al. Sunscreens: Are they beneficial for health? An overview of endocrine disrupting properties of UV-filters. *Int J Androl* 2012; 35:424-36.
23. Jie X, Yang W, Jie Y, Hashim JH, Liu XY, Fan QY, et al. Toxic effect of gestational exposure to nonylphenol on F1 male rats. *Birth Defects Res B Dev Reprod Toxicol* 2010;89:418-28.
24. United Nations Environment Programme (UNEP), World Health Organization (WHO). *State of the Science of Endocrine Disrupting Chemicals*. Geneva, Switzerland: UNEP and WHO;2012.

25. Bergonzi R, Specchia C, Dinolfo M, Tomasi C, De Palma G, Frusca T, et al. Distribution of persistent organochlorine pollutants in maternal and foetal tissues: Data from an Italian polluted urban area. *Chemosphere* 2009; 76:747-54.
26. Casals-Casas C, Desvergne B. Endocrine disruptors: From endocrine to metabolic disruption. *Annu Rev Physiol* 2011; 73:135-62.
27. Krause M, Klit A, Blomberg Jensen M, Søbørg T, Frederiksen H, Schlumpf M, et al. Sunscreens: Are they beneficial for health? An overview of endocrine disrupting properties of UV-filters. *Int J Androl* 2012; 35:424-36.
28. Oishi S. Effects of propyl paraben on the male reproductive system. *Food Chem Toxicol* 2002; 40:1807-13.
29. Gray LE Jr, Wolf C, Lambright C, Mann P, Price M, Cooper RL, et al. Administration of potentially antiandrogenic pesticides (procymidone, linuron, iprodione, chlozolate, p, p'-DDE, and ketoconazole and toxic substance (dibutyl and diethylhexyl phthalate, PCB 169, and ethane dimethane sulphonate) during sexual differentiation produces diverse profiles of reproductive malformations in the male rat. *Toxicol Ind Health* 1999;15:94-118.
30. Swan SH, Elkin EP, Fenster L. The question of declining sperm density revisited: An analysis of 101 studies published 1934- 1996. *Environ Health Perspect* 2000;108:961-6.
31. Madronich S, McKenzie RL, Björn LO, Caldwell MM. Changes in biologically active ultraviolet radiation reaching the earth's surface. *J Photochem Photobiol B* 1998;46:5-19.
32. Peon J, Zewail AH. DNA/RNA nucleotides and nucleosides: Direct measurement of excited-state lifetimes by femtosecond fluorescence up-conversion. *Chem Phys Lett* 2001;348:255-62.
33. Little JW. Melanoma: Etiology, treatment, and dental implications. *Gen Dent* 2006;54:61-6.
34. Garibyan L, Fisher DE. How sunlight causes melanoma. *Curr Oncol Rep* 2010;12:319-26.

Corresponding Author

Dr. Syed Mohammed Shoaib

Assistant Professor of Physics

Employee Id No.643

MANUU Polytechnic Kadapa Satellite Campus

Applied Physics Lab, School of Technology

Maulana Azad National Urdu University

Gachibowli, Hyderabad-500 032

Telangana State, India.

Mobile: +919494729917

