Review Article

Overview of Chemicals in Cosmetics and their Associated Adverse Effects

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ABSTRACT

Cosmetics are the products that are used to apply to our skin, face and hair every day and its uses are increasing around the world. The substance which are used to improve the appearance are comes under the category of cosmetics. In day-to-day life people are exposed to a great range of harmful chemicals in the form of cosmetics, from the various daily used products like dermal products, beauty products and hair products. These products are used to enhance the appearance or to maintain personal hygiene. Cosmetic products may contain various ingredients. Such substances improve the quality and shelf life of the products but may be toxic to human health. This review paper discusses the composition of various cosmetic products, their role, adverse effects and also highlights about the replacements of some of the harmful ingredients caused by cosmetic products based on the various scientific literature review.

Keywords: Dermal products, Beauty products, Hair products, Role, Adverse effects, Replacement.

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INTRODUCTION

Hygiene means the keeping oneself and one's surroundings clean in order to prevent illness or disease, which can cause by the unhealthy lifestyle. Consequently, skin hygiene includes both skin cleaning and also the taking care of skin and maintaining its health.[1] Cosmetics are products are used to apply on the body for the purpose of beautification, cleansing action or to improve the appearance and enhancing the attractiveness of human body.[2]The skin is the largest human organ. It is a physical protective barrier of the body, and it performs many key functions necessary for life. For centuries, both women and men have embellished their bodies, which was associated with various body care and skin care.[3]

As like the skin, the hair is also an integrated system with peculiar physical and chemical behavior. It is a complex structure of some morphological components that act as a unit. Hair can be modified totally, through it physical appearance such as length, color, shape, texture, means we can totally change physical features of our hair.[4] In order to maintain or to enhance the health of hair and skin, numerous cosmetic preparations are used by us on daily basis. Some common cosmetics products have their associated toxicities, factors such as advertisement, peer pressure and social acceptance; affect the choice of skincare products applied by most women. Robertson et al conducted a study and reached a conclusion that women who use make-up have some sense of self-doubt and are anxious and lack confidence about them.[2] Cosmetics products are consumed worldwide with frequent use which leads to increasing the exposure of the human body to various chemical compounds. Hence, specifying the incidence of cosmetic side effects is somewhat difficult because users with fewer side effects do not need medical advice.[5]

Many of the chemical additives pose toxic effects to the human body, exhibiting health risks from a mild hypersensitivity to life-threatening or lethal intoxication. Therefore, the application of cosmeceuticals has recently become a mounting issue confronting public health.[6] The United Nations Environmental Program determines that approximately 70,000 synthetic chemicals are used by all across the world along with 1000 new chemicals which is being introduced every year.[7] From the past 20 years, the innovation in cosmetic industry is enormous, resulting in a wide range of products is used to protect and moisturize skin as well as to combat inflammation and age signals. Also, consumers are more concerned about their appearance, trying to accept the new society paradigms.[8]

DERMAL PRODUCTS

SOAP

Soaps consist of long chain fatty acid alkali salts with a pH 9 - 10. Soaps are surface active substances that lower the surface tension on the skin and remove dirt, sebum, and oils from cosmetic products, microorganisms, and exfoliated corneum cells in an emulsified form. Soap is the

prototype anionic surfactant, plays a prominent role in the personal cleansing market. However, soap frequently can cause dryness and irritation of the skin.[1]The ideal cleanser should do this without irritating, damaging or disrupting the skin and the moisture skin barrier.The term "soap" generally refers to any cleansing agent.[9]

Some commonly used ingredients with their adverse effects

Sodium lauryl sulphate and ammonium lauryl sulphate

It is used to decrease the surface and interfacial tension between two phases. It help to trap and remove dirt, debris from skin.[9] Sodium lauryl sulfate and Ammonium lauryl sulfate had a degenerative effect on the cell membranes because of its protein denaturing property. Sodium lauryl sulfate caused slight to moderate irritation. Application of 10% -30% detergents caused skin corrosion and severe irritation.[10] Dermatitis is made worse with hydrocortisone formulation containing SLS.[11]

Parabens

Parabens are used as preservatives which are used to prevent the growth of microorganism. It easily penetrates into the skin and interferes with hormonal function. They are associated with neurotoxicity and cancer among other adverse health effects.[12] Skin enzymes cannot process all topically applied parabens, and some amount of them is retained in the body tissues, which can cause the irritation to the skin.[13]

Triclosan

Triclosan **(**TCS) are used as preservative but may be absorbed and reach systemic circulation through the mucous membrane by dermal exposure due to its lipophilic properties.[14,15]TCS enhanced hepatocyte proliferation and reactive oxygen species (ROS) production thereby acting as a liver tumor promoter.[16,17]TCS alleviated allergic skin reactions upon irritation. TCS is not rapidly metabolized dermally and the mostly remains as the parent compound for at least 24 hr and produce number of adverse effects.[16,18]

Dyes and pigments

Dyes and pigments are used to impart proper color in cosmetic. Synthetic dyes are the most commonly used in the industry.[19]Dyes can release amines, which are considered to be carcinogenic. It can also lead to dermatitis, anaphylaxis, and itching of the lips and skin. Dyes and pigments can cause edema and allergic reactions.[20]

SUNSCREEN

Sunscreens are the cosmetic agents that are used to prevent the skin from harmful rays of sun. It protects skin from damage. Sunscreen also known 'sunblock' lotion which helps to protect against sunburn and most importantly prevent skin cancer.[21]Sunscreen safety and efficacy is evaluated based upon the properties of the individual chemicals in a formulation.[22]

Some commonly used ingredients with their adverse effect

Oxybenzone

Oxybenzone is a chemical compound used in sunscreen, which helps in protecting from both UVA and UVB rays. It has broad-spectrum activity.[23]Oxybenzone has the ability to penetrate the skin, and its metabolic breakdown products are excreted in the urine.[24]Detectable levels of oxybenzone have been found in human urine, serum, and breast milk, and it is hypothesized that this is due to sunscreen use[21]. Oxybenzone has been reported to produce contact and photo contact allergy reactions, implemented as a possible endocrine disruptor.[25]

Octinoxate

Octinoxate is a substance that shields the skin from harmful UVB rays, but not UVA sun rays. On packaging, it may be listed as OMC, methoxy-cinnamate or ethylhexylmethoxycinnamate.[26]Octinoxate is absorbed and influenced endogenous reproductive hormone levels in humans after topical application. It affects thyroid hormone production and also cause allergic reactions after exposure to ultraviolet light.[27]

Homosalate

Homosalate absorbs UVB rays only. It belongs to the salicylate class and has peak absorption of 306 nm. It is approved by the FDA for a maximum concentration of 15%.[28]Homosalate has been found to penetrate the skin, disrupt hormones and produce toxic breakdown byproducts over. It's having estrogenic activity and endocrine disrupting effects, homosalate has been detected in human placental tissues. It's also having effect on survival of human trophoblast cells.[29]

Titanium dioxide

Titanium dioxide absorbs UVB rays and some UVA rays but may not provide full UVA protection. TiO2 has a greater whitening effect. Titanium dioxide is used in sunscreens basically due to its ability to reflect and scatter ultraviolet radiation.[30]It cause adverse effects via induction of oxidative stress resulting in cell damage, genotoxicity, inflammation, immune response etc.[31]TiO_2 nanoparticles are classified as "possible carcinogenic to humans" by inhalation classified by the International Agency for Research on Cancer(IARC) and as occupational carcinogen by the national institute for occupational safety and health.[32]

MOISTURIZER

Moisturizer is used to moisten the skin. Moisturizer and emollient are regarded as synonymous, even when occlusive and humectants are also part of it.[33]Moisturizer

is used to treat various dermatomes which co-exist with skin dryness such as in atopic disorders.[34]Moisturizers are often used in the prevention and treatment of irritant contact dermatitis. The moisturizer was applied shortly before SLS provocation, which cause rashes and redness, sensitive skin are more prone to redness and rashes. Moisturizer can also cause the acne, oiliness and small bumps on face and skin.[35]

Some commonly used ingredients with their adverse effect

BHT and BHA

Antioxidants are used to prevent the oxidation of the product. Synthetic antioxidants - Ex. BHT, BHA and propyl gallate are widely used because they are inexpensive to produce[36]. Skin irritation with or without signs and symptoms of inflammation, is the most frequent adverse effect.[37]Butylatedhydroxyanisole and butylated hydroxytoluene, also known as BHA and BHT, are known as the incredibly harmful chemical found mostly in moisturizers. BHA being a potential carcinogen and affecting hormone function, while BHT is devastating reproductive effects and also may cause multiple organ problems and blood coagulation. BHA and BHT can cause allergic reactions to the skin.[38]The International Agency for Research on Cancer categories BHA as a possible human carcinogen.[39] The European Commission on Endocrine Disruption has also listed BHA as a Category 1 priority substance, based on evidence that it interferes with hormone function.[40]

POWDERS

Powders are considered as one of the essential products of skin care preparations. Powders help to absorbs moisture well and to prevent the friction and also keep skin dry and prevent rashes.[41] They are used to provide adhesiveness, slipperiness, absorbance, smoothness and the bloom effect they provide to the skin or hair.[42]Regular cosmetic powders can get attached to larger particles that would deposit in the upper airways of the human respiratory system. Respiratory problems like wheezing, coughing, shallow breathing, or chronic lung irritation commonly known as talcosis. Talco-asbestosis, produced due to the inhalation of talc with asbestiform fibers.[43]

Some commonly used ingredients with their adverse effect

Zinc oxides and Zinc stearate

These materials should capable to cover small imperfections, enlarged pores and minor blemishes of the skin. It is a good covering agent with good sunscreen property because zinc oxide has protective effect against ultraviolet rays.[41] Zinc enters the body primarily through the digestive and respiratory tracts, and the absorption is low through the skin. Respiratory tract irritation, symptoms of "caster fever" (flu-like illness), gastrointestinal disorders and anemia occur. There are also tendencies to inflammation of the upper respiratory tract, excessive sweating.[44]

Talc

It is used as a adhesive materials. They are crucial as they are helpful in imparting adhesion i.e., it holds on the powder materials not only to the surface of the skin but also to the powder puff. Slip character helps in convenient spreading of the powder on the skin, which in turn provides smoothness to the skin.[41]It is a purified hydrated magnesium silicate. It is widely acceptable in the formulation of face powders. It helps in imparting with softness. It is neutral and unable to absorb water.[41]Talc is classified as an irritant dust in powder form.[45] Talc causes three types of pulmonary diseases associated with aspiration talcosilicosis, talcoasbestosis, and talcosis is a long-term exposure disease of talc. Miners and millers exposed to talc free of asbestos and silica developed obstructive pulmonary effects.[46]

Table 1: Dermal products.

Sr. no.	Dermal products	Ingredients	Role	Replacement
1	Soap	Sodium and ammonium lauryl sulphate	surfactant	Reetha, chickpeas and shikekai[47]
		Paraben and Triclosan	Preservative	Extract of basil, clove, neem and rosemary[48]
		Dyes and pigments	Provide colour	Barberry(yellow), Annato (orange), Manjishtha (red)[49]
2.	Sunscreen	Oxybenzone	Filter UVA and UVB rays	Sacred lotus[50]
		Octinoxate	Filter only UVB rays	Aloe vera, raspberry and glycerine[50]
		Homosalate	Organic UV filter	Sandalwood, ashwagandha and arjuna[50]
		TiO2 and Zinc oxide	Inorganic UV filter	Jojoba oil, argon oil, shea butter[50]
3.	Moisturizer	BHT and BHA	Antioxidant	Papaya seeds, coffee leaves and chestnut[51]
4.	Powder	Talc	Adhesive, slip material	Fumes silica, corn starch[52]
		Zinc oxide and Zinc stearate	Covering agent	Gum tragacanth53

BEAUTY PRODUCTS

EYELINER AND KOHL

Kohl (a form of cosmetic product) is applied around the eyelid Margins. It is the earliest forms of eye cosmetic products, and its use is documented since the Early Bronze Age (c. 4000–1500 BC). This form of kohl contains a natural lead compound called as galena.[54]There are two famous forms of eyeliner such as infallible pencil eyeliner and water-based eyeliner (Color Stay liquid eyeliner). The branded eyeliner product contains over 20 ingredients such as hydrogenated olive oil esters, candelilla wax, *Aloe barbadensis* leaf juice, etc.[55]

Some commonly used ingredients with their adverse effects:

Propylene glycol

Propylene glycol has humectant properties as it draws water into your skin. It acts as a barrier to keep your eye skin hydrated. Propylene glycol is a common irritant. Therefore, for sensitive skin or skin allergies, do a patch test with new propylene glycol-containing products before using the products as it is.[56]

Pigments

Pigments may contain heavy metals which may appear as impurities in finished cosmetics products. It is a byproduct during the manufacturing process which may be formed by the breakdown of ingredients or an environmental contaminant of raw ingredients.[57]

Cadmium

Cadmium (Cd) is a heavy toxic metal like Lead (Pb) which is present as impurities in eyeliner. The corneal epithelium can be affected by Cd.[58]

Lead

The lead content in eyeliner ranges from 26.43 to 95.55 µg/g. According to the study, it is concluded that all eyeliner samples tested can be potentially toxic. The toxicity of lead arises from its ability to bond with –SH groups of enzymes and cellular proteins, which causes changes in their functions or their inactivation.[59]

BHT and TEA

A preservative is a natural or synthetic chemical that is added to prevent decomposition of products by microbial growth or by undesirable chemical changes.[60]Butylatedhydroxytoluene (BHT) is a preservative widely used in eyeliner for its antioxidative properties. BHT is the main causes of contact dermatitis. BHT causes mild irritation to the eye. The small amount of BHT with an average concentration of 0.0002% - 0.5% in eyeliner is safe for public use.[61]Triethanolamine (TEA) is used as a pH adjuster in eyeliner. Along with BHT and ammonium thioglycolate, triethanolamine is also a frequent cause of allergic contact dermatitis.[61]The incidence of allergic contact dermatitis on the eyelids is approximately 4%. Common allergens like pearlescent additives, emollients, and preservatives are known to cause allergic contact dermatitis.[62]

MASCARA

Mascara is used to enhance the eyelashes to appear thicker, darker, and longer.[61] Mascara is used to enhance the natural beauty of eyelashes and mimic the youthful characteristics of the eye with age.[63] Mascara is sold in liquid form in tubes having an application wand. Mascara classifies as both non-water resistant and water-resistant formulas. Mascara poses some health-related issue for users such as bacterial infections and allergic reactions in the periorbital region. Bacterial contamination of the mascara increases with certain period of time, as preservatives loses its efficiency and increase the risk of bacterial contact of the wand.[61]

The most common cause of bacterial infection is Pseudomonas aeruginosa and Staphylococcus aureus which leads to the development of blepharitis, chalazions, conjunctivitis and also dry eye syndrome.[61,64]

Some commonly used ingredients with their adverse effects

Alcohol denatured

Alcohol denatured is used as Antimicrobial, masking, solvent and viscosity controlling agents. The safety of denatured alcohol ultimately depends on the denaturants used such as salicylic acid, methyl salicylate, sodium salicylate, methyl alcohol, t-butyl alcohol and diethyl phthalate. Ethanol exerts an immediate cytotoxic effect on the corneal epithelial cells which interferes cell viability and induce apoptosis.[61,65]

Cyclopentasiloxane

Cyclopentasiloxane (D5) is used as an emollient and a solvent. It has great prevalence in periorbital cosmetic formulations.[61] It was used in 60 out of 499 mascara formulations in concentrations of 0.06-33%.[66] D5 is not classified as a mutagenic or carcinogenic compound and therefore does not produce toxicity.[60] but may cause Persistence and bioaccumulation.[67]

Phenoxyethanol

It is the most commonly used preservative in approximately 20% of products registered in the US.[68] It is nonirritant to the human skin but may cause mucous membrane irritation in the eye.[61]

Shellac

Shellac is also called as lacca, or gomme-laque. It is mainly used in eyeliners and mascara as a curling agent. It has both irritant and sensitizing properties and may cause allergic contact dermatitis.[69]

FOUNDATION

People use foundation to even the skin tone; cover the pores, blemishes, and wrinkles and improve skin lightness and undertone. Various textures have been introduced to the users such as cream, liquid, cushion, and powder. Among them, the liquid foundation provides better coverage and lasts for a whole day. The formulation includes water, Oils or Waxes, Talc, Pigments and Fragrances, etc.[70]

Some commonly used ingredients with their adverse effects:

Formaldehyde and Parabens

The preservatives and fragrances are added to increase the shelf life of the product and to have a good odour and appearance to the users. The most common preservative is paraben and formaldehyde releaser. Parabens have relatively low toxicity, good stability and nonvolatility.[71] Formaldehyde and paraformaldehyde are toxic preservatives that result in an great potential risk to cancer and allergy.[72]

Talc

Talc is used to absorb moisture and imparts softness to the skin.[41] It may contain the known human carcinogen asbestos that can cause mesothelioma (malignant tumour which affects the lining of the chest or abdomen) and also may cause talcosis (a long-term exposure diseases of talc).[46]

LIPSTICK

Lipstick is one of the forms of cosmetic used by the women to give an attractive color and appearance to the lips. Lipstick can change the apparent facial characteristic of women. These are usually formulated as molded sticks and consist of coloring pigments dispersed in a fatty base consisting of a suitable blend of oils, fats and waxes and perfumes. Lipstick is classifying as lip balms, glosses, crayons, pencils, liners, and stains. Balms and glosses are more translucent and not as dark or vibrant.[73]

Continuous use of lipstick may cause serious adverse effects like skin irritation, skin discoloration, cancer etc. Colorant or pigment plays an important role in the formulation as it determines the esthetical value of lipstick. Colorant is derived from synthetic and natural sources. The synthetic dyes that give color to the lipstick are dangerous to human on consumption and may cause adverse effect such as allergy, dermatitis, skin discoloration, drying of lips, etc. Sometimes they may be carcinogenic and even fatal. This limitation leads to the use of natural colorants which is derived from natural sources such as plants, insects, and algae.[74]

Some commonly used ingredients with their adverse effects

Iron oxides and mica

They add color and luminescence in the product. Iron oxides have persistent and bioaccumulate properties. Mica, if ingested poses potential gastrointestinal or liver toxicity hazards.[75]

Table 2: Beauty products.

Sr. no.	Beauty products	Ingredients	Role	Replacement
1.	Eyeliner	Propylene glycol	Humectant	-
		Pigments	Coloring agent	-
		BHA and BHT	Preservatives and antioxidant	Papaya seeds, coffee leaves and chestnut[51]
2.	Mascara	Alcohol denaturated	Antimicrobial, solvent	-
		Cyclopentasiloxane (CD5)	Carcinogenic compound, Persistence and bioaccumulation	-
		Phenoxyethanol	Preservatives	-
		Shellac	Curling agent	-
3.	Foundation	Formaldehyde	Preservatives	-
		Talc	Absorbs moisture	Fumes silica, corn starch[52]
4.	Lipstick	Iron oxides and Mica	Coloring agent	Lycopene (Red), Carotenoids (Orange)[74]

HAIR PRODUCTS

SHAMPOO

Shampoo may be defined as a cosmetic preparation which is meant for the washing of scalp and hairs and packed in a form Convenient for use.[76]Shampoo may be defined as the preparation containing surface active agents (Surfactant) which are used to remove dirt, grease, and debris from hair and scalp and other parts of body without affecting the natural loss of hair. Incidentally, the term shampoo entered the English language through India where the Hindi word ‘‘Champoo’’ was used mean as massage or to press.[77]

Some commonly used ingredients with their adverse effects

Ammonium and sodium Lauryl Sulfate

It is used as surfactant in the preparation of shampoo for effective cleaning of hairs. It removes all the oil from hair as they are drying agents.[9] It can cause dryness to the skin, hairs and irritation to skin and eyes.[78]

Parabens and Formaldehyde

They are used to preserve shampoo against bacteria or mould contamination. Parabens are the most widely used preservatives in personal care products. It is most common preservatives used in shampoo.[79] Associated with neurotoxicity and cancer among other adverse Health effects.[81] Formaldehyde helps to prevent microbes from growing in water-based products.[80] Formaldehyde is considered as human carcinogen agent and also causes allergic skin reactions and rashes.[82]

Diethyl and dimethyl Pthalates

Pthalates are used as a gelling agent and plasticizer. They promote pleasant scent to shampoo even allowing it to linger (allow it to stay in a place for longer time) on the hair for days. Mainly found in hair spray.[83] Phthalates also reduce sperm count in men, reproductive defects in the developing foetus (when the mother is exposed during pregnancy), among other health effects.

CONDITIONERS

Conditioners or Conditioning agents are defined as additives which are used to enhance feel, appearance, fullness, lubricity, reflectance, and general manageability of hair. They are also used to recondition the hair following chemical treatments such as waving, straightening and following physical trauma induced by hair drying, brushing, and styling.[77]Conditioners are categorized into five main groups such as polymers, oils, waxes, hydrolyzed amino acid and cationic molecules. They are available in a wide range of forms including viscous liquids, gels, and creams, as well as thinner lotions and sprays. Hair conditioner is usually used after the hair has been washed with shampoo. Conditioner may also prevent static electricity, improve cosmetic shine and increase protection.[84,85]

Some commonly used ingredients with their adverse effects

Acidifier (Citric acid)

Acidifier are acidity regulators which maintains conditioners pH at about 2.5-3.5.[86] They remove grease and help the surface of the hair to be smoother and less scaly so that light is better reflected. If it is used in high proportion can cause serious allergic reaction and rashes.[87]

Fragrances (Benzophenone)

Fragrance is often synthetic. Some fragrances are suspected of causing health problems in some individuals. Concentrated amount of fragrance inside the body can induce organ toxicity, hormonal disorder, reproductive disorder and cancer.[88,89]

SERUM

Hair serum is a silicone-based styling product designed to coat the hair's surface to help impart added shine, smoothness, hydration, and humidity and pollution protection. Serum can be used on wet or dry hair. It can be used as both pre-styling treatment and a finishing product. It is used to improve hair growth and to prevent hair loss, for proper styling of hairs.[90]

Some commonly used ingredients with their adverse effects

Silicone

Silicone is the polymers that create a layer on hair strands. They prevent damage caused by sun exposure, wind, pollutants and dust. Silicone is initially incorporated into the hair serum for conditioning and moisturizing property.[91] Silicone can cause build up on hairs, resulting in a dry feel and dull appearance. It may notice that hair becomes weaker and more prone to breakage. Also, sometimes it causes stickiness and viscosity is lower.[92]

HAIR DYE

Hair dye is natural or synthetic substance used to change the color of hair. Hair dyeing can either achieved by use of oxidative hair dye products (often referred to as "permanent hair dyes") or by non-oxidative hair dye products (often referred to as temporary or direct dyes). Hair dyes and their ingredients have moderate to low acute toxicity.[93,94]

Some commonly used ingredients with their adverse effects

Paraphenylenediamine

It is used as due for dark color shades. Darker the color contains higher amount of PPD.PPD is linked to skin sensitization. The most common severe reactions cause marked reddening, blistering and swelling of the eyelids, scalp, face and neck.[95]

Ammonia

Ammonia is used for rising the pH level of the hair which helps to opens the hair cuticle i.e., outer layer of hair and inserts the hair color into the hair. The hair cuticle is damaged when it is constantly opened. After some time, hair loses its natural shine and becomes dry and brittle. If ammonia levels rise in the liver is unable to metabolize this toxic compound results in enzymatic defect or hepatocellular damage.[96]

Toluene

Toluene-2,5-diamine (PTD) is one of the most frequently used oxidative hair dyes. They are used as colorants in permanent hair dyes.[97;98]It shows local inflammatory response by ear swelling and linked to liver damage, kidney

damage, birth defects and pregnancy loss. Sometimes it is carcinogenic.[99]

DMDM hydantoin

DMDM hydantoin is a preservative and antimicrobial agent. It's considered a "formaldehyde donor." That means it releases a small amount of formaldehyde over time to help keep products fresh and free from contaminants. It causes irritation to eyes, nose and throat and is a carcinogenic agent which can cause cancer if used for longer time. It is safe at normal level .[100]

Lead acetate

It is used as color additive for dark color shade hair dyes. Lead in higher concentrations leads to breast cancer. Lead causes reduction in fertility in both males and females and also causes menstrual problems. It is neurotoxins which causes brain impairment.[101]

Resorcinol

It reacts with the developer in order to bond permanently to the hair strand, i.e. formula to provide permanent color effect. It causes hormonal imbalance. It is considered to be toxic and can cause skin and eye irritation. Resorcinol also sometimes causes contact dermatitis.[102]

Table 3: Hair Products

Sr.no	Hair Products	Ingredients	Role	Replacement
1	Shampoo	Ammonium and Sodium lauryl sulfate	Surfactant	Reetha and Shikekai.[102,103]
		Parabens and Formaldehyde	Preservatives	Extract of basil, clove and neem.[104]
		Diethyl and dimethyl pthalates	Plasticizer and gelling agent	DINCH (1,2-cyclohexane dicarboxylic acid diisononyl ester).[105]
2	Conditioner	Citric acid	Acidifier	Lemon Balm.[106]
		Benzophenone	Fragrances	Tea, coffee leaves and henna powder.[107]
3	Serum	Silicone	Polymer	Jojoba oil and Shea butter.[108,109]
4	Hair dye	Paraphenylenediamine	Coloring agent	Henna, coffee and beetroot.[108]
		Resorcinol	Bond permanent color	-
		DMDM hydantoin	Antimicrobial agent	4-Chloro resorcinol.[110]
		Toluene	Oxidative agent	-
		Ammonia	Open hair cuticle	-
		Lead acetate	Color additive	-

DISCUSSION AND CONCLUSION

In this review paper, we have discussed the role, health hazards and replacement of some of the ingredient of the chosen cosmetics. Cosmetic contains various toxic chemicals in there formulation, which can cause the serious adverse effects on the different organ system of human being. In recent years, the use of cosmeceutical-based personal care and beauty products has ever increased, around the world. Currently, an increasing number of compounds are being assimilated in the formulation of cosmetic products as preservatives, antioxidants, surfactants, etc. to intensify the performance, quality, value, and lifespan of cosmetics. It is estimated that the annual retail sale of cosmetics & other personal care products is growing in the range of 15-20% annually, thus placing the domestic demand in India as one of the fastest growing across the world. Over the past 5 years total demand has grew by 60%. So to avoid the damage to human health, Strict cosmeto-vigilance program is important around the world, which include the awareness on harmful effects, improvement in manufacturing, marketing, and use of cosmetic product by the population should be monitor. Researchers from academia, consultancy firms, governmental organizations, and cosmetic companies should carry out further progress to keep updating the consumers regarding the dark-sides, and health-related harmful apprehensions of cosmetics. In addition, the industry-motivated initiatives to abate environmental impact through green, sustainable and eco-friendly product development grasp significant perspective.[111]

On the other hand, the demand for natural cosmetics is stronger than ever, being now widely considered a serious threat to the worldwide economy and society. These new concepts had improved the use of natural extracts as active ingredients in cosmetics, leading to the reuse of old-style active ingredients obtained from natural sources, as well as to new green compounds obtained considering sustainable principles. India cosmetics industry is driven by the high personal disposable income of people, rising awareness towards body aesthetics, coupled with increasing demand for herbal cosmetic products. High adoption of herbal products has led to growth of the segment at 15% annually, on the back of the fact that people are becoming more aware of possible side effects

on skin by constantly use of chemical formulations-based cosmetics.[112]

Cosmeto-vigilance program is related to rules and proper regulations of the cosmetics ingredients, which is required to protect the health of Indian population. Cosmeto-vigilance program is strictly followed in European countries but they do not have any amendment in India. Hence, in growing world it is very necessary for the proper use and amendment of cosmetovigilance, which can help to control the hazardous ingredients in cosmetics and thus helps in improving our confidence on use of these agents. It is necessary to discuss the particular adverse effects data with the cosmetic user, stakeholders and sellers. Now, a day's consumer is also looking for the natural alternative over the synthetic compounds, which obtained from the Natural sources. So the further research must be carried out to obtain the more data on the natural alternative of cosmetic ingredients and also on the safety of cosmetic product exist in market. As large number of human populations are using cosmetic products, but they are unaware about the hazardous chemicals that are added in particular formulation. Due to this it is very important to implementation as well as proper rules and regulations for the hazardous effects of ingredients should be there. Because only proper regulations can overcome the problems related to cosmetics and also can provide a better product to the consumer.

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