

Chemicals In Cosmetics: Enhancing Awareness Among Students Through Science Teaching

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Doi: 10.47750/pnr.2022.13. S05.195

Abstract

Students are the part of society, they are desirous to meet societal norms. So many times they are ready to keep apart the education to get better physical looks. Their role models are from virtual world having dazzling faces with perfect figure. To get similar looks, adolescent even younger students are using a wide range of cosmetics. To relate cosmetics and science may look strange but a deep & close relation exists between them. A few years ago, naturally available materials were used to enhance physical attractiveness. But, the rapidly changing societal norms have replaced natural beauty products to chemicalized cosmetics. These cosmetics are in range as the cosmetics manufacturing companies are throwing attractive offers to promote their sales. Simultaneously, the user of cosmetics are the students of our schools. The global information and measurement company, Nielsen India Private Limited has reported that urban female adolescents are purchasing more skin care and makeup products than ever before. The educators can't ignore this facet of life, it is the part of their duty to teach students about the noxious nature of cosmetics. This paper is about the enhancing awareness for the use of cosmetics among students via teaching chemical science. Methodology adopted is description of data accessed via internet.

Keywords- societal norms, cosmetics, chemicalized, chemical science

INTRODUCTION-

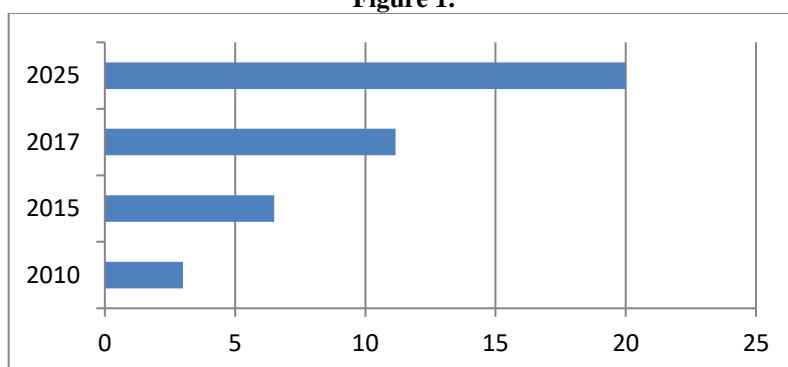
This is human tendency to present himself in the most impressive manner. For this purpose a wide range of cosmetics is used by men and women. As we know that adolescents are highly conscious to their looks. They are always aware how others perceive them. At the same time they are insecure about their appearance as physical changes like hair growth on hands & legs, acnes plays important role. In present time, unrealistic models from social media also encourage them to have similar looks like them. "selfie culture" is insisting to look perfect all of the day. According to the global information and measurement company, Nielsen India Private Limited has reported that urban female adolescents are purchasing more skin care and makeup products than ever before. The teenagers of India and Thailand go extreme with their skins in order to lighten it, as they had been mindwashed that dark is not beautiful. Hence, the markets of these countries are congested with bleaching products to make them look like "western woman or girls". Plastic surgeries are also being used to increase the beauty of women and many others. Therefore, in order to educate young children and young adults; educators, guardians and adults must participate actively. The youngsters must realise that the qualities of self-confidence and true beauty emerges from ourselves. The word 'cosmetics' is used for substances which may add beauty to body & hair. In other terms 'techniques of dress and ornaments'. The definition of cosmetics is broader, in general terms cosmetics are the makeup products to enhance beauty or to hide any skin ailment. According to the U.S. Food and Drug Administration (FDA) cosmetics are defined as "articles for beautification, cleansing or altering physical appearance". According to the Drugs & Cosmetics Act 1940, India, a 'cosmetic' is defined as an article that can be used in any part of the human body. It may be rubbed, poured, sprinkled or sprayed on. Cosmetic is applied to any part of human body to clean, beautify, promote attractiveness or to alter the appearance. The Drugs and Cosmetics Rules, 1945 elaborates the procedure to manufacture cosmetics in India. Cosmetics can be classified, under Schedule M-II, into 11 broad product categories:

1. Powders,
2. Creams, lotions, emulsions, pastes, cleansing milks, shampoos, pomade, brilliantine, shaving creams, hair oils etc..
3. Nail Polishes and Nail Lacquers
4. Lipstick and Lip Gloss etc..
5. Depilatories
6. Preparations used for eyes
7. Aerosol
8. Alcoholic Fragrance Solutions (Cologne)
9. Hair Dyes
10. Tooth Powders and Tooth Pastes etc.

11. Toilet Sops

Cosmetics are constituted from a mixture of chemical compounds derived from either natural sources or created synthetically. On the basis of their applications they are categorized as ‘decorative’ and ‘caring’ cosmetics. On the basis of physical states in which they are found these can be powders (face powder, talcum powder) , liquid cream emulsions (moisturisers, cold creams, foundations etc.) and liquid (deodorants, perfumes etc.) forms. Global cosmetics market is estimated to be valued at USD 380.2 billion in 2021 to USD 465.0 billion by 2026 with a CAGR value of 5.5 % from 2021 to 2026. As the reports of 2020 the revenue of the market of cosmetics worldwide is 80.73 billion USD. As per these reports, the Asia-Pacific region accounted for approximately 43 percent of the global market . According to a study, the market size of the cosmetic industry in India has raised 3 billion dollars to 11.16 billion dollars from 2010 to 2017. It is expected to be 20 billion dollars approx. till 2025 (Figure 1 & table 1) . The high disposable income of people & penetration of electronic gadgets in daily life are the basic intangible reasons for accelerating demand of cosmetics. Cosmetic market is packed with teen product lines and teenage cosmetic brands. The target of the cosmetic brands are the most unsatisfied groups of society. They attract consumers by promising to make their skin clean, clear and fair instantly. The adolescents are the softest and easiest target for them. Even a brand has launched a specific makeup kit for teens & preteens.

Figure 1.



Market size of the cosmetic industry across India from 2010 to 2025 (in billion U. S. Dollars) (From: Statista 2022)

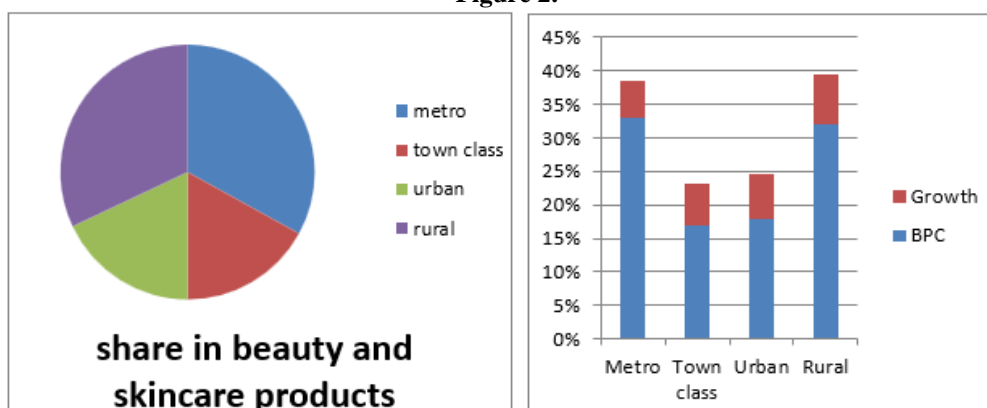
Table 1: market size of beauty and personal care industry across India 2016 to 2020, with an estimate for 2025.

Year	Market size (in billion Indian rupees)
2025	1,981
2020	1,120
2019	1,267
2016	868

From: Statista 2022

The graph (Figure2) represents the large share of metro and rural areas in market of beauty products. One study found that around 40-50 % of teenagers are wearing makeup. They are applying eyebrow pencils, mascara, eyeliner, foundation, fairness cream, concealer and blush etc.. These are not only girls using cosmetics but boys too are using hair gels & deodorants . A study from Neilsen reports that use of certain cosmetics has risen sharply among children aged between 10-12. The reason behind that is the influence of social media in their life styles. They want to look attractive in selfies & video chats.

Figure 2.



Source: Euromonitor, Neilson and A. T. Kearney

The cosmetics are very effective for instant results. These are much capable of attracting a large proportion of population. These are used simultaneously by each generation . Though there are legal compliance at international and

national level to ensure safety for humans. The manufacturers may take advantage of differences in the regulations at different levels. The cosmetic industry is highly innovative & experimental sector. Many chemicals that should be banned from cosmetics, as proposed in California Assembly Bill 2762 are:

-Formaldehyde, paraformaldehyde and methylene glycol - these are known carcinogens.

-Quaternium 15 – it releases formaldehyde.

-Mercury, dibutyl and diethylhexyl phthalates

-Parabens (isobutyl and isopropyl), the long chain per- and polyfluoroalkyl substances.

-M- and o-phenylenediamine,

all of these toxic chemicals have been banned by the European Union and many other countries. Some of the chemicals do not have to be disclosed on the package as they are essential components of fragrance. Since 2009, 595 cosmetics manufacturers have been reported using 88 chemicals, in more than 73,000 products that have been linked to birth defects, reproductive harms and cancer. Though all the cosmetics and personal care products pose little risk to health still there must be awareness among customers for the ingredients present in cosmetics. The preteens & teens including their elders know nothing regarding to the presence of such harmful chemicals in cosmetics. (Table 2)

Table 2: List of chemicals used in cosmetics :

s.no.	Name of chemical	adverse effects on humans	Reasons for their use
1.	sulphates	May cause irritation to eyes and skin, premature clear off colour from hair.	They act as surfactants and are used for lathering purposes.
2.	parabens	They produce estrogen (female sex hormone) in excess and interfere with reproductive and brain function. Mimic estrogen may result in excessive cell division in the breast.	Used as preservative to keep the makeup fresh and germ free.
3.	phthalates	These are reproductive and developmental toxins.	Used for spreadability of any product, also used as softeners in shampoos.
4.	Triclosan	It is an endocrine disruptor and a skin irritant. It breaks down slowly so it is threat to environment and dangerous to aquatic life.	It is anti-bacterial in nature so effective against microbes.
5.	formaldehyde	It is related to hair loss, scalp burns, asthma and neurotoxicity.	It is used to prevent the growth of bacteria. It is used in hair straightening treatments, nail hardeners, shampoos and deodorants.
6.	Polyethylene glycol	It may cause cancer and respiratory disorders. It can also strip off the natural oils(sebum) from skin. It triggers the sebaceous glands to make more sebum that results in greasy skin.	It is used as thickening agent in lotions and sunscreens.
7.	diethanolamine	It is carcinogen in nature. It is also a respiratory toxin.	It is foaming agent commonly present in body washes, shampoos and bubble baths.
8.	Alcohol	It disrupts the skin renewal process.	Used as common solvent. It is helpful in better absorption of products hence it is used in certain creams and lotions.
9.	hydroquinone	It is a known carcinogen. Prolonged use may lead to whitening of skin.	It is used to treat acne scars & hyperpigmentation. It works by reducing the melanin pigment-producing cells.
10.	petrolatum	It also checks water to enter in skin. That's why there is temptation to reapply lip balm.	It is used as softening agent. It creates a barrier to water to prevent evaporation. It is used in lip balms.
11.	Toluene	It can affect the human central nervous system and may lead to fatigue, headache and drowsiness. It may carry the risk of birth effects and blood cancer.	It is used in nail polishes and hair dyes. It is used as solvent.
12.	talc	It is associated with ovarian cancer. When inhaled, it may cause lung tumors.	It is the softest mineral present in nature. It is used to absorb moisture and is present in baby powders, blush and in some soaps.
13.	Heavy metals (lead,arsenic,mercury,aluminium,zinc,cromiumand antimony)	These are neurotoxic in nature and may be linked to miscarriage, reduced fertility and delays in puberty for females.	It is found in lipsticks, eyeliners and whitening toothpaste.
14.	Benzophenone, oxybenzone,ethoxy cinnamate, homosalate	They may cause damage to the skin of the body. They are endocrine disrupters.	They are used in sunscreens as they are believed to absorb light.
15.	Carbon black	It is added to FDA's banned product list, still found in cosmetics. It is linked to cancer and organ toxicity.	Dark black pigment in eye make comes from carbon black.
16.	Synthetic colours	It may cause skin irritations, acne breakouts and skin cancers.	They are derived from petroleum or coal tar. The higher the percentage of coal tar, the heavier the pigment. Used in deep colour lipsticks.
17.	Fragrances	These are potential carcinogens, irritants and endocrine disrupters.	These are used in perfumes, moisturisers, shampoo and conditioners. There is no organization that restricts the manufactures from using fragrances.

Status in India- the manufacturing of cosmetic products in India is regulated under the Drugs and Cosmetics Act 1940 and rules 1945 and Labeling Declarations by Beureau of Indian Standards(BIS). Bureau of Indian standards(BIS) has provided the specification for skin creams and lipsticks in the Indian standards (IS) 6608:2004 and 9875:1990

respectively. IS 6608:2004 says that if all the raw materials requiring test for heavy metals have been so tested and comply with the requirements, then the manufacturer may not test the finished cosmetic for heavy metals and arsenic. The dyes colors (pigments lakes) if used in the manufacture of skin creams and lipstick shall comply with IS 4707(part 1) subject to the provision of schedule Q of drugs and cosmetics act and rules, issued by the government of India, and as amended from time to time. Other ingredients shall comply with the provisions of IS 4707(Part 2). Rule 134 of drugs and cosmetics rules has laid down restrictions on use of cosmetics containing dyes, colors and pigments other than those specified by the bureau of Indian standards(IS:4707 Part 1 as amended) and schedule Q. The permitted Synthetic organic colors and natural organic colors used in the cosmetic shall not contain more than:

- 2 ppm(parts per million) of arsenic calculated as arsenic trioxide.
- 20 ppm(parts per million) of lead calculated as lead
- 100 ppm of heavy metals other than lead calculated as the total of the respective metals.

These colouring agents are recognized as safe. Maximum concentration in finished products is mentioned in some. The one exception is for coal-tar hair dyes. The FDA cannot take action against a coal-tar hair dye for safety reasons as long as it has a special warning statement on the label and directions for use. It is also an important issue to understand that any product may be safe or unsafe in different conditions. As any ingredient may be safe in face wash or body wash but may be harmful in the products which are worn for hours. Different countries have different legal frameworks for cosmetics manufacturing. The laws to control the use of banned chemicals are so limited that known carcinogens are legally permitted in personal care products. Unlike food and drugs, personal care products aren't required to announce the each harmful chemicals they have within.

How is it related to students-

1. Any issue which is either directly related to students or having an important place in their lives must be discussed and resolved by concerning persons. This is neither aesthetics nor cosmetology, but science only. The implications of science adopted by cosmetic manufacturers leaving behind the rules & regulations.
2. Conversation about cosmetics & makeup- It must not be treated as taboo but discussed in mindful manner.
3. Students could be assigned a project work related to the ingredients (chemicals) present in cosmetics.
4. Students must be directed to read carefully the labels on cosmetics, to know the names of ingredients present in particular product. They must be able to understand the abbreviations written on labels e.g. DEA is the abbreviation for diethanolamine, the compounds that end with -eth are petrolatum ingredients, chemicals under methyl, butyl, propyl fall under parabens, polyethylene glycol is abbreviated as PEG and is shown as numbers like 100, 120, 14M, 30, 32, 40, 75 and so on.
5. Workshops may be arranged to the related topic.
6. Woefully, we cannot seize advertisements, makeup shops and counters, but we can definitely spread awareness regarding to the use of cosmetics.

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