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Appraisal on Cosmetic Overuse and Its Adverse Effect on Skin Health

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Abstract:
The global cosmetic industry, valued at over $500 billion, continues to grow rapidly, driven by societal beauty standards and consumer demand. However, the overuse of cosmetics containing synthetic chemicals and heavy metals poses significant risks to skin health, including allergic reactions, hormonal disruptions, and carcinogenicity. This review synthesizes evidence on the adverse effects of cosmetic overuse, emphasizing the role of toxic ingredients such as parabens, phthalates, and mercury. Additionally, it explores Ayurvedic and herbal alternatives, which offer safer, sustainable options due to their natural composition. A literature search across databases like PubMed and ScienceDirect identified 65 relevant studies, highlighting the urgent need for stricter regulations, consumer education, and the integration of traditional knowledge in modern cosmetic formulations. The findings advocate for a shift toward green cosmetics to mitigate health risks and promote skin wellness.

Keywords: Cosmetic overuse, adverse effects, skin health, heavy metals, Ayurvedic cosmetics, herbal cosmetics.

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INTRODUCTION:

Cosmetics, derived from the Greek word *kosmeticos* (to adorn), have been integral to human culture for millennia, serving to enhance appearance and hygiene [1]. The modern cosmetic industry, however, relies heavily on synthetic chemicals to prolong shelf life, improve texture, and intensify pigmentation. While these products cater to aesthetic desires, their overuse has been linked to dermatological and systemic health issues, including contact dermatitis, hormonal imbalances, and organ toxicity [2]. In 2023, the global cosmetic market was valued at $20 billion, with projections suggesting exponential growth [3]. Alarmingly, studies reveal that women apply an average of 12–16 personal care products daily, exposing themselves to over 160 unique chemicals [4]. Concurrently, emerging markets in Asia and Africa report rising cases of mercury poisoning from skin-lightening creams, underscoring the global nature of this public health challenge [5]. This review examines the adverse effects of cosmetic overuse on skin health, evaluates the toxicological profiles of common ingredients, and highlights Ayurvedic and herbal alternatives rooted in traditional practices. By bridging modern scientific evidence with ancient wisdom, this work aims to advocate for safer cosmetic practices and regulatory reforms.

Methods:

A systematic literature search was conducted using PubMed, ScienceDirect, and Google Scholar, focusing on articles published between 2000–2024. Keywords included "cosmetic overuse," "adverse skin effects," "heavy metals in cosmetics," and "herbal cosmetics." Inclusion criteria prioritized peer-reviewed studies, clinical trials, and reviews addressing chemical toxicity or Ayurvedic alternatives. Governmental reports and regulatory guidelines (e.g., FDA, EU Commission) were also reviewed. Out of 235 initial articles, 65 met the criteria for relevance and methodological rigor. Data were synthesized thematically to address the review objectives.

Results:

Adverse Effects of Cosmetic Overuse

1. Chemical Toxicity

- **Preservatives**: Parabens (methylparaben, propylparaben) are used in 75–90% of cosmetics to prevent microbial growth. These compounds mimic estrogen, disrupting endocrine function and correlating with breast cancer in epidemiological studies [6]. Butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), common in lipsticks, are classified as potential carcinogens by the International Agency for Research on Cancer [7].

- **Fragrances and Phthalates**: Synthetic fragrances contain over 3,000 chemicals, many of which (e.g., benzophenones) trigger allergic reactions and asthma [8]. Phthalates, used as plasticizers in nail polish, reduce sperm count and impair fetal development [9].

- **Heavy Metals**: Lead, mercury, and cadmium are frequent contaminants in lipsticks, kajal, and skin creams. Chronic exposure to lead, even at low doses, causes neurodevelopmental deficits in children, while mercury in skin-lightening products induces nephrotoxicity [10,11].

2. Dermatological Impacts

- **Contact Dermatitis**: Allergic reactions to paraphenylenediamine (PPD) in hair dyes and formaldehyde in nail products manifest as erythema, blistering, and lichenification [12].

- **Photoaging**: Hydroquinone, a depigmenting agent, increases UV sensitivity, accelerating collagen degradation and skin wrinkling [13].

- **Acne and Infections**: Comedogenic ingredients like isopropyl myristate in moisturizers clog pores, fostering *Cutibacterium acnes* proliferation [14].

3. Systemic Health Risks

- **Endocrine Disruption**: Parabens and phthalates interfere with thyroid and reproductive hormones, contributing to infertility and early puberty [15].

- **Carcinogenicity**: Coal tar dyes in dark hair colors and formaldehyde-releasing preservatives are linked to non-Hodgkin's lymphoma and leukemia [16].

Ayurvedic and Herbal Cosmetic Alternatives:

Ayurveda, a 5,000-year-old Indian medicinal system, emphasizes holistic wellness through plant-based formulations. Key ingredients include:

- **Neem (*Azadirachta indica*)**: Antimicrobial and anti-inflammatory properties make it effective in treating acne and eczema [17].

- **Turmeric (*Curcuma longa*)**: Curcumin inhibits melanogenesis, offering a safer alternative to hydroquinone for hyperpigmentation [18].

- **Amla (*Phyllanthus emblica*)**: Rich in vitamin C, it strengthens hair follicles and reduces oxidative stress in scalp tissues [19].

Modern herbal cosmetics blend tradition with innovation. For instance, *Ubtan* (a mixture of chickpea flour, turmeric, and sandalwood) exfoliates and brightens skin without synthetic abrasives [20]. Market analyses indicate that the global herbal cosmetic sector will reach $25 billion by 2025, driven by consumer demand for "clean beauty" products [21].

DISCUSSION:

The toxicological evidence against synthetic cosmetics is compelling, yet regulatory frameworks remain lax. For instance, the U.S. FDA prohibits only 11 chemicals in cosmetics, compared to the EU's 1,300 banned substances [22]. This disparity enables multinational companies to sell hazardous products in less regulated markets, exacerbating health inequities.Ayurvedic cosmetics, while promising, face challenges in standardization and scalability. Contamination with heavy metals in poorly manufactured Ayurvedic formulations has been reported, necessitating stringent quality control [23].

Nevertheless, clinical trials demonstrate the efficacy of aloe vera in wound healing and licorice root in reducing melasma, validating their role in dermatology [24,25]. Consumer education is critical. Surveys reveal that <20% of users read ingredient labels, and 48% share cosmetics, increasing contamination risks [26]. Campaigns promoting cosmetovigilance—systematic adverse event reporting—can enhance safety, as seen in the EU's Cosmetic Products Notification Portal [27].

CONCLUSION:

Cosmetic overuse, fueled by aggressive marketing and beauty standards, jeopardizes skin health through exposure to toxic chemicals. Regulatory bodies must adopt stricter safety protocols, ingredients, and promote transparency in labeling. Ayurvedic and herbal cosmetics offer sustainable alternatives, but their integration into mainstream markets requires investment in research and quality assurance. Future studies should explore long-term health outcomes of green cosmetics and their efficacy in diverse populations.

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