

Cosmeceuticals: Current Trends With Future Prospects

Priya Pandey¹, Mrs. Nirupama Singh², Dr. Tarkeshwar P. Shukla³

^{1, 2, 3} S.C.P.M College Of Pharmacy, Lucknow Road Haripur, Gonda

Abstract- *In recent days many cosmoceuticals products are introduced in market. The term cosmoceuticals was introduced by Albert Kligman. Basically, Cosmeceuticals means combination of cosmetics and pharmaceuticals which are applied topically as cosmetics however contain ingredients that affect the skin's biological function. It is a bridge between pharmaceutical and personal care industry. The use of cosmoceuticals has drastically climbed in recent years. Cosmeceuticals are the latest trend of beauty care products. Everyone wants to beautify their outer looks, cosmoceuticals provide a great appearance to skin as well as hair hence it is fastest growing segment in the natural personal care industry. This review aims to highlight the beauty care industry and filled with all required information related to different classes of cosmoceuticals and types of cosmoceuticals ingredients along with regulatory . Cosmeceuticals represents a new category of products placed between cosmetics and pharmaceutical that are intended for the enhancement of both the health and beauty of skin.*

Cosmeceuticals means the combination of cosmetics and pharmaceutical.

Cosmeceuticals are the largest addition to the health industry and are described as cosmetic products with drugs-like activities.

The term Cosmeceuticals was coined by Kilgman but these lines of products became popular in 1996.

Keywords- Cosmeceuticals, Cosmeceutical products, pharmaceutical drug, Sunscreens, Moisturizer's, Cosmetics, Nutricosmetics, Dermocosmetics. Cosmoceuticals, Cosmoceuticals chemistry , skin Cosmoceuticals Health industry, active cosmoceuticals ,nutricosmetics ,Beauty care products

I. INTRODUCTION

In recent days a new hot concept is trending in cosmetic industry which is known as "Cosmeceutical". Cosmeceuticals are the leading segment of the natural personal care industry. Basically Cosmeceuticals are nothing but the combination of the cosmetics and pharmaceuticals.

According to FD&C act, cosmetic is defined as a substance which is intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body for cleans, beautify, promote the attractiveness, or altering the appearance. Pharmaceuticals are essentially drug products. According to FD&C act drugs are defined as a substance intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease or it is intended to affect the structure or any function of the human or any other animal's body.

Cosmeceuticals are the cosmetic products with the pharmaceutical activity ingredients and intended to enhance the health and beauty of skin. Raymond Reed coined the term 'Cosmeceutical' in 1961 while in 1971, Albert Kingman reintroduced the term cosmeceutical by developing a formula to improve the appearance of UV damaged and wrinkled skin, by using retinoic acid. Cosmeceuticals are generally presented as lotions, creams, gels, pastes and dyes like formulations and are mostly targeted at dermatological issues. Cosmeceuticals improve appearance by providing nutrients required for healthy skin and hair. Ideal properties of cosmeceutical agents are efficacy, safety, formulation stability, novelty, and patent protection, metabolism within skin. Most of the cosmeceutical formulations use fundamental ingredients such as peptides, retinol, coenzyme Q- 10, ceramides, alpha lipoic acid, alpha hydroxy acids, beta hydroxy acids, aloe Vera, panthenol, kinetin and vitamins A, C, E. The term cosmeceutical is not approved by the Federal Food, Drug, and Cosmetic Act. As we know cosmoceuticals are the topical formulations which were neither pure cosmetic nor pure drug like wise active cosmetics, nutricosmetics, performance cosmetics, functional cosmetics, and dermaceuticals are the alternative terms of cosmoceuticals. The science of beauty and health are making new advancements. In this article we try to summarize all the basic information related to beauty products, an also this attempt has been made to sum up the various types of cosmoceuticals and their regulatory aspects.

Cosmetics: The Federal Food, Drug & Cosmetic Act (FD&C Act) defines cosmetics as "articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance."^[12]

Pharmaceuticals(drugs):The FD&C Act defines drugs as "articles intended for use in the diagnosis, cure, mitigation, treatment, or prevention of disease and articles (other than food) intended to affect the structure or any function of the body of man or other animals." [12] or Any substance or combination of substances which may be used in or administered to human beings either with a view to restoring, correcting or modifying physiological functions by exerting a pharmacological, immunological or metabolic action, or to making a medical diagnosis. [8] The importance of beautification to the mankind has been known since the pre-historic time and the desire to look beautiful and healthy has been developing in the society. Many pharmaceutical-based cosmetic serums contain natural active components that claim to have a medical or drug-like effect on the skin, hair, and nails including anti-aging, anti-wrinkle, anti-acne, hydrating, moisturizing, repairing, anti-hair fall, anti-fungal etc. Cosmeceuticals are ingredients or products that possess cosmetic and pharmaceutical benefits, which can be obtained without prescription.

Nutricosmetics: They are related to dietary supplement or food or beverage products with additives that are marketed as having medical benefits that affect appearance. [9] Nutricosmetics is a relatively new term that refers to products and ingredients that act as nutritional supplements but carry the purpose of treating the skin. Nutricosmetics are more commonly known as Beauty Supplements and these supplements come in the forms of drops, pills, powders, shakes, and gummies [10].

Dermocosmetics: Dermocosmetic products have been specially formulated to restore skin health. They protect against the many stresses of contemporary life and natural skin aging. Dermocosmetic products consist of fine molecules that penetrate to the dermis, the middle layer. At this depth, creams have an optimal impact in correcting problems, protecting skin tissue, preventing unwanted marks such as wrinkles [13].

CLASSIFICATION: Terms like active cosmetics, nutricosmetics, performance cosmetics, functional cosmetics, and dermaceuticals, are similar to the term cosmeceutical. All of these terms follow the same definition that is Cosmeceuticals formulations are neither pure cosmetics, nor pure drug, they are hybrid products which lie between drugs and cosmetics. Cosmeceuticals products classified into following categories:

- 1) Skin cosmeceutical product.
- 2) Hair cosmeceutical product.
- 3) Other cosmeceutical product.

1. Skin Care Cosmeceuticals Products:

Cosmetics and skin care products are widely used in everyday grooming. Skin is the largest organ in the body and it protects internal environment from external harmful radiations, air pollution, toxic materials as well as normal aging process which cause damage to building blocks of skin. Use of cosmetics or other beauty products will not cause the skin to heal or maintain as it is. Cosmeceuticals products have medicinal or drug-like properties that are able to affect the biological functioning of skin by the type of functional ingredients that they contain. Skin care cosmeceutical products enhance the appearance, texture or the functioning of the skin.

a) Sunscreen Agent

Sunscreen agents are used to prevent sunburns, skin cancers. Chemical sunscreen agents and physical sunscreen agents are the two types of sunscreen agents. Chemical sunscreen agents are..

those which protect the skin from the sun by absorbing the ultraviolet (UV) and visible sun rays, while physical sunscreen agents are those which reflect, scatter, absorb, or block the rays. Creams, lotions, gels, ointments, pastes, oils, butters, saks, and sprays are the common forms of sunscreens

b) Moisturizing Agents.

Stratum corneum is the outermost layer of the epidermis which consists of keratinized cells. It is the primary barrier between the body and the environment. Its main purpose is to keep inside in & outside out. This layer is rich in cholesterol, free fatty acids, and ceramides. Various oily preparations like Mineral oil, Lanolin, Cyclomethicone, etc. have been used to maintain the fluidity of the skin. Moisturizers are used to reduce fine lines, smoothen and hydrate the skin. Some components like l-cystine, niacinamide, ceramide, and hyaluronic acid have anti-inflammatory properties.

C) Skin Lightening Agents:

Skin lightening agents are applied to treat hyperpigmentation. Hyperpigmentation is the process of changing of color intensity of the skin to a darker hue, which occurs when melanin levels get increased into the epidermis as well as the dermis, or both. Mainly two pathophysiological processes are the reason for this change: one is melanocytosis (increased number of melanocytes) and another one is

melanosis (increased amount of melanin). Agents which are main reason of skin lightening, works best when melanosis or melanocytosis is confined to the epidermis. When SLA used topically then it produces a reversible depigmentation of the skin by inhibiting of the enzymatic oxidation of tyrosine to 3, 4-dihydroxyphenylalanine (dopa).[5] Melisma like disorders which occurs due to hyperpigmentation are also treated by the SLA. All SLA act on the natural production of melanin, and mostly used SLA are known as competitive inhibitors of tyrosine, it one of the key enzymes in melanogenic.[4] Examples of some commonly used cosmeceutical ingredients are as follows:

Tetrahydrocurcuminoids:

It is obtained from white (color free) carbinoids of turmeric (*curcuma longa*) canonic acid, cosmarinic acid, ursolic acid from rosemary extract *Rosemarinus officinalis* as antioxidants are the compounds which are used to promotes the tissue damage and restoring the healthy status of skin.^[6,7]

Boswellacids: It is acquired from *Boswell serrata*. The fundamental characteristic is to inhibit the enzymes responsible for inflammation (5 - lipoxygenase) and damage of the skin.^[6,7]

Antioxidants: Antioxidants reduce free radical damage so that preventing impairment at cellular level. They also inhibit the inflammation which leads to the breakdown of collagen. In addition external insults like UV radiation, drugs, air pollutants and the skin also has to cope with endogenous mitogens, most prominently reactive oxygen species and other free radicals. Common antioxidants are alpha-lipoic acid, L-ascorbic acid, niacinamide, N-acetyl-glucosamine, α -tocopherol, and ubiquinone.^[11]

Along with the external insults like UV radiation, drugs, air pollutants and heat and or cold, the skin also has to cope with endogenous mitogens, most importantly reactive oxygen species (ROS) and other free radicals. These species are constantly generated during physiological cellular metabolism. To respond to the harmful effects of ROS, the skin is armed with an antioxidant system to maintain equilibrium between the pro-oxidants, or damaging agents and the antioxidants, or protective agents; these antioxidants mediate at different levels in the protective process.^[1]

Retinoid: A great amount of research has concentrated on its use as an antiaging compound as well as its use for other cutaneous disorders. Vitamin A and its derivatives have 2 main functions: they act as antioxidants, and they activate specific genes and proteins. Structural changes underlying the

cosmetic benefits include correction of epidermal atrophy, deposition of new collagen, generation of new vessels, and enhancement of mitogenesis. This enhanced mitogenesis promotes the shedding of melanin-laden keratinocytes, resulting in bleaching and subsequent depigmentation. The ability of topical tretinoin to improve the appearance of aged and photo-damaged skin by reducing wrinkles, decreasing laxity bleaching hyperpigmented spots, and bringing about a smoother surface have been well studied and documented.

Hydroxy acids: Hydroxy acids are organic carboxylic acids classified into alpha hydroxy acids (AHAs) and beta hydroxy acids (BHAs) according to their molecular structure. Many are derived from natural sources and are often referred to as fruit acids. The different AHAs include the following: glycolic acid, lactic acid, citric acid, mandelic acid, malic acid, and tartaric acid. AHAs have been shown to decrease the signs of aging. The skin appears smoother and more uniform. BHAs are aromatic compounds. Salicylic acid is the reference BHA; it has dermolytic properties and helps in various xerotic and ichthyotic disorders. Other BHAs include 2-hydroxy-5-octanoyl benzoic acid, also known as beta-lipohydroxy acid (B-LHA), and tropic acid. Studies show that AHAs may increase sensitivity to UV radiation and that sunscreen application may be advisable when these products are used.

Panthenol: Panthenol, the alcohol analog of vitamin B-5, is a water-soluble humectant commonly found in various commercial skin creams, lipsticks, lotions, and hair preparations. It is stable in the presence of oxygen and light but unstable in the presence of acids, bases, and high temperatures. Panthenol is converted in the skin to pantothenic acid, which is an important component on coenzyme A essential for normal cellular metabolism.

Vitamin C: Vitamin C is necessary for the hydroxylation of procollagen, proline, and lysine. Vitamin C improves and normalizes the changes caused by photo-damage. Vitamin C has been used effectively to stimulate collagen repair, thus diminishing some of the effects of photo-aging on skin. However, vitamin C is easily degraded by heat and light, which along with its high acidity, presents certain challenges for use in a multipurpose skin care formulation. A recently introduced synthetic collagen fraction offers greater compatibility and, along with improved efficacy.

Vitamin E: Vitamin E (alpha-tocopherol) is the major lipophilic antioxidant in plasma, membranes, and tissues. The term vitamin E collectively refers to 8 naturally occurring molecules (4 tocopherols and 4 tocotrienols), all of which exhibit vitamin E activity. Its major role is generally considered to be the arrest of chain propagation in lipid

peroxidation by scavenging lipid peroxy radicals, hence protecting the cell membrane from destruction. Vitamin E topically applied before UV irradiation has been shown to reduce erythema, edema, sunburn cells, immunosuppression caused by sunlight, and DNA.

De-pigmenting Agent:Hyperpigmentation is the result of an increased amount of melanin in the epidermis, the dermis, or both. This pigmentary change can be divided into 2 pathophysiologic processes: melanocytosis (increased number of melanocytes) and melanosis (increased amount of melanin). Depigmenting agents work best when melanosis or melanocytosis is restricted to the epidermis. Depigmenting agents can be divided into several groups:

1. Phenolic compounds include the following:

- i) Hydroquinone
- ii) Monobenzylether of hydroquinone
- iii) 4-Methoxyphenol
- iv) 4-Isopropylcatechol
- v) 4-Hydroxyanisol
- vi) N -acetyl-4-S-cysteaminyphenol

2. Nonphenolic compounds include the following:

- i) Corticosteroids
- ii) Tretinoin
- iii) Azelaic acid
- iv) N -acetylcystein
- v) L-ascorbyl-2-phosphate
- vi) Kojic acid

3. Combination formulas include the following:

- i) Kligman's formula
- ii) Pathak's formula
- iii) Westerhof's formula.

Botulinum A exotoxin:

An exotoxin is a neurotoxin synthesised by the bacterium *Clostridium botulinum*. This toxin is now being used by cosmetically oriented specialists for the treatment of a huge variety of movement-associated wrinkles on the face and neck.^[2]

Exfoliants:

Exfoliants stimulate skin turnover by removing adherent cells in the stratum corneum. Exfoliants that are commonly found in cosmeceutical preparations include

salicylic acid (SA), lactic acid and glycolic acid. There are worries that frequent use of SA and AHAs could cause the dermis and epidermis to be more susceptible to penetration by UV radiation. Therefore, patients should be instructed to use adequate sun protection. The Cosmetic Ingredient Review Expert Panel concluded that SAs are safe to use when formulated to avoid skin irritation and to be non-photosensitizing, or when directions for use include the daily application of sun protection. Adequate data is not available to establish a limit on SA concentration or to detect the minimum pH of formulations to inhibit skin irritation.^[1]

Progesterone: Progesterone cream claims to heal skin conditions, such as acne, psoriasis, rosacea, seborrheal, and keratosis.

Hormones: Hormonal creams claim to be the most effective means to halt or slow the aging process by reversing the loss in tone and elasticity of the skin.

Kinetin: Clinical studies have shown that Kinetin reverses the signs of photo damaged skin and develops the overall appearance of the skin, thereby making it smoother and more even in colour and noticeably diminishes the appearance of fine lines and wrinkles. The studies has also showed that Kinetin significantly improves the skin barrier function, assisting skin to retain more moisture, thereby making the skin more softer and smoother.

2. Hair Care Cosmeceuticals Products: The appearance of the hair is a feature of the body over which humans, unlike all other land mammals, has direct control. Hair care, colour, and style play an important role in people's physical appearance and self perception. Among the earliest forms of hair cosmetic procedures in ancient Egypt were hair setting by the use of mud and hair colouring with henna. In ancient Greece and Rome, countless ointments and tonics were recommended for the beautification of the hair, as well as remedies for the treatment of scalp diseases.^[7] Cosmetics for the treatment of hair are applied topically to the scalp and hair. While they can never be used for therapeutic purposes, they must be harmless to the skin and scalp, to the hair, and to the mucous membranes and should not have any toxic effect, general or local, in normal conditions of their use.^[6] A hair cosmeceutical product contains – special care ingredients, conditioning agents, and hair growth stimulants. A number of ingredients are, fatty ingredients, quaternized cationic derivatives, hydrolyzed proteins, cationic polymers, and silicones. Therefore, current antidandruff ingredients are antifungal agents that are– octopirox, zinc pyrithione, and ketoconazole. A minoxidil-related compound (2, 4-diamino-pyrimidine-3-oxide) is a cosmetic agent acting as a topical hair growth

stimulant used to prevent inflammation and perifollicular fibrosis.^[11]

3. Other Cosmeceutical Products: Virtually, oil glands and subcutaneous fat poorly present in the skin beneath the eye. For the reduction of the signs of premature aging, it is needed to protection and plenty of moisture to replenish and repair the delicate skin. The skin becomes thinner, drier and rougher after the aging. This condition arises due to over-exposure to the elements. Many topical products intermediate in this process. The products intended for this area, should gentle and this ingredient work from inside out by interacting with cell under the skin surface without irritating the eyes. There are ever such cosmeceutical eye creams which nourish the skin along with natural emollients and beneficial nutrients. The other functional ingredients including butcher's broom, chamomile, and vitamin E, antioxidants – vitamins A, C and E, green tea and tiare flower, *Ginkgo biloba* and also cucumber, calendula and α -bisabolol, an active constituent of chamomile, to calm irritated skin. Yeast is the chief ingredient and also protect against future skin damage and also helps to sleek up the wrinkles. The eye wrinkle cream helps forestall the signs of aging and generally wheat germ and corn oil, squalene and carrot extract. Eye firming fluid has aloe, an algae extract from seaweed that helps the skin to maintain elasticity. Lawlor had developed dental care compositions, which are useful for providing a substantive composition on the surfaces of oral cavity, which can provide prophylactic, therapeutic, and cosmetics

REGULATORY ASPECTS: The claims made about drugs are subject to high scrutiny by the Food and Drug Administration (FDA) review and approval process, but cosmetics are not subject to mandatory FDA review. Much confusion exist regarding the status of 'cosmeceuticals.' Although there is no legal class called cosmeceuticals, this term has found application and recognition to designate the products at the borderline between cosmetics and pharmaceuticals. Cosmeceuticals are not subject to FDA review and the Federal Food, Drug and Cosmetic Act do not recognize the term itself. It is also often difficult for consumers to determine whether 'claims' about the actions or efficacies of cosmeceuticals are in fact valid unless the product has been approved by the FDA or equivalent agency. Some experts are calling for increased regulation of cosmeceuticals that would require only proof of safety, which is not mandatory for cosmetics. Some countries have the classes of products that fall between the two categories of cosmetics and drugs: for example, Japan has 'Quasi-drugs'; Thailand has 'controlled cosmetics' and Hong Kong has 'cosmetic-type drugs. The regulations of cosmeceuticals have not been harmonized between the USA, European, Asian and other countries.

II. FUTURE PROSPECTS

After adding small amount of cosmeceutical agents to the cosmetic formulations which do not require medical regulations and it would improve the production of cosmeceuticals that could help to improve the skin, nail, and body mass growth. New challenges will also be presented to government regulatory agencies as more chemicals with true biological activity are invented and tested.

Global beauty retail sales are expected to reach \$580 billion in retail sales by 2027, revealing expansion throughout different segments of beauty. The industry is expected to grow at a 6% CAGR between 2022 and 2027, according to The State of Fashion: Beauty, a new report from The Business of Fashion and Company. The report also identifies five critical dynamics for the industry over the five-year period: geographic rebalancing; the need for indies to scale; merger and acquisition opportunities; Gen-Z's influence on consumer loyalty; and wellness and self-care expansions. Beauty has now cemented its reputation as a resilient industry that can consistently deliver high margins and new avenues of expansion. According to the report, key players in the beauty industry will need to deepen their geographic diversification in order to maintain a reputation as an industry that consistently delivers high margins and new avenues of expansion. Per the report, China's dominance of the beauty industry is decreasing as the United States becomes more competitive and markets in the **Middle East** and India emerge as hotspots. The report estimates China to reach approximately \$96 billion and North America to reach approximately \$115 billion by 2027. While the U.S. and China are expected to remain the industry's heavyweight markets, other markets, like the Middle East and India, could play larger roles in driving revenues than previously expected. In the Middle East and Africa, beauty retail sales are forecast to reach \$47 billion by 2027, due in part to economic modernization under new government programs and high household income, per the report. India's beauty retail sales are expected to increase to \$21 billion by 2027, spurred by increasing levels of disposable income and a younger, digitally savvy generation of shoppers. Brands can also find opportunities by targeting consumers with products and services in luxury beauty, which has the potential to grow from around \$20 billion to around \$40 billion by 2027, according to the report. While the U.S. and China are expected to remain the industry's heavyweight markets, other markets, like the Middle East and India, could play larger roles in driving revenues than previously expected. In the Middle East and Africa, beauty retail sales are forecast to reach \$47 billion by 2027, due in part to economic modernization under new government programs and high household income, per the report. India's beauty retail sales are expected to increase to

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III. CONCLUSION

The usage of cosmeceuticals has drastically increased in early years, which enhance the range of products to increase the beauty of the patients associated with dermal problems. But, at times, where generations are intensely concerned for their beauty, various manufacturing companies are challenging and working hard to deliver conclusive results to meet requirements of the patients. Cosmeceuticals as like vitamins, sunscreens, hydroxyl acids & many more have proved their worth in treating skin diseases, which helps to enhancing the skin texture. Clinical trials of cosmeceuticals are important factor to know about the relations between skin and cosmeceuticals. The universal trend in the cosmetic industry towards emerging medicinally active cosmetics and in the pharmaceutical industry towards cosmetically concerned with medicinal products increases apart from the current 'life-style' ideology. The most influential angle over the coming 5 years will be the links between internal health, beauty, and anti-aging. The next big beauty trend will include skin gestibles that will promote beauty from the inside out, borrowing of pharmaceutical terms for cosmetic applications, amino peptides to make the skin more elastic, neuro mediators which are chemicals to tell the brain to be happy and the blurring of boundaries between surgery and cosmetics. The trend towards therapeutic cosmetics is sure to result in the need to obtain a better understanding of modern ingredients and assessment techniques. In conclusion, cosmeceuticals are not only the external beautification but also it improves the internal beauty through the health-related function. The health group professionals will show the importance to cosmeceutical products and develop the awareness about these products.

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