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A REVIEW: COSMETICS AND COSMECEUTICALS

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ABSTRACT

Unquestionably, cosmetics have dominated the global personal care market. It would not be an exaggeration to say that over 30% to 40% of all dermatologists' prescriptions worldwide contain cosmeceuticals, despite the widespread uncertainty regarding its definition and range. An essential component of aesthetics is skin health. To achieve this goal, scientists and dermatologists work to create new processes and materials. Consensually, it is acknowledged that cosmeceuticals can have "pharmaceutical therapeutic benefits," but not always "biological therapeutic benefits." The creation and promotion of goods that fall in between cosmetics and pharmaceuticals is the foundation of the cosmeceutical sector. Cosmetics are defined by Japanese pharmaceutical affairs law as "any article intended to be used by means of rubbing, sprinkling or by similar application to the human body for cleansing, beautifying, promoting attractiveness and altering appearance of the human body, and for maintaining the health of the skin and hair," provided that the article's action on the human body is mild. Because herbs offer so many advantageous qualities, including sunscreen, antiaging, moisturising, antioxidant, anticellulite, and antibacterial activities, they have been employed in maintaining and enhancing human attractiveness. Herbal products are mild, biodegradable, and have lower toxicity profiles than synthetic cosmetics. Herbal cosmetics—referred to as "Products" from here on—are created by mixing one or more herbal ingredients with various legal cosmetic ingredients to achieve specific cosmetic benefits only.

KEYWORD: Cosmeceuticals, Cosmetics, Herbal Cosmetics, Skin, Dermatologist.

INTRODUCTION

Humans are drawn to beauty by nature. As a result, the use of cosmetics and personal care products can be traced back to ancient times, when the pursuit of beauty led to the use of ingredients like milk, honey, lemon juice, clay, mud, and even arsenic. Today, the cosmetics and personal care sector is a critical one that makes a significant contribution to the global GDP.[1] According to the definition of a cosmetic product, it is "any substance or preparation intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips and external genital organs) or with teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance and/or correcting body odours and/or protecting them or keeping them in good conditions." The definition of cosmetics in Japanese pharmaceutical affairs law is "any article intended to be used by means of rubbing, sprinkling or by similar application to the human body for cleansing, beautifying, promoting attractiveness and altering appearance of the human body, and for maintaining the health of the skin and hair," provided that the article's action on the human body is mild.[2]

The categories of cosmetics and cosmeceuticals can include a wide range of items. These goods can be broadly divided into categories like skincare, haircare, coloring, fragrances, and general care items. Skincare products are made to alter the way the skin looks or feels. The purpose of hair products is to alter the texture, colour, or appearance of hair. Coloring agents are decorative items that can momentarily alter the colour of skin and hair. Fragrances are fragrant preparations intended to alter the natural body odors. And general care items are those created to encourage cleaning and maintenance of body parts other than the skin and hair. There are numerous subcategories that can be used for each of these categories. Additionally, a number of products may simultaneously fall under more than one category and perform many functions in this fashion. This classification is not exclusive, and numerous sources group personal care goods in various alternative ways.[3]

Herbal cosmetics, often known as products, are created by formulating a base using a variety of legal cosmetic components before adding one or more herbal substances that are used solely to deliver specified cosmetic benefits. Herbs don't provide quick fixes. They provide a means of realigning the body with nature. Recently, a large variety of cosmetic and toiletry formulas have been created and developed using Indian herbs. In addition to their historically noted uses, Indian herbs have also been tested in certain recent personal care product

experiments. Because of their skin-friendliness and lack of side effects, herbal medicines are becoming more and more popular. The best thing about herbal cosmetics is that they are made only from plants, so there are no side effects.[4]

Major Classes of Cosmetics

Cosmetics are defined as personal care items used to freshen, scent, alter the outward look, or reduce or eliminate body odour without affecting the cells' or tissues' physiology. Cosmetics are often exempt from severe regulations because they do not contain active substances in their formulas. Cosmetic formulations may face new regulatory requirements as a result of the addition of active ingredients, necessitating extensive testing to support the efficacy claims made in scientific research and clinical trials. Cleansers and moisturisers are the two main categories of cosmetics covered here. Hair dyes are frequently classified as cosmetics. A lengthy discussion on the formulations, advantages, and potential risks of using hair dyes would be necessary despite the fact that they are frequently used to promote a younger appearance.[5]

Moisturizers

Moisturizers that improve moisture and soften and supple the stratum corneum are also regarded as cosmeceuticals. In order to reduce transepidermal water loss (TEWL), boost skin moisture, and reduce the proliferative activity of the epidermis, moisturisers can impact stratum corneum architecture and skin barrier homeostasis.[6] The preferred delivery strategy for moisturisers is typically creams. Fats, oils, humectants, emulsifiers, and preservatives are all components of moisturisers. Mineral oils, waxes, long-chain esters, fatty acids, lanolin, and mono-, di-, and triglycerides are typical fats and oils used in moisturisers. Humectants are chemicals that draw water to them. The group of humectants known as -hydroxy acids is significant. Urea, glycerin, propylene glycol, and pyrrolidone carboxylic acid are other ingredients.[7]

The primary purpose of moisturisers, which are topically applied formulas, is to maintain and repair the skin barrier. It is believed that adequate skin hydration is just as important as using sunscreen to fight the effects of aging. Moisturizers can soften and smooth the stratum corneum and stop the development of dry patches and the resulting tightness, itching, and irritation through a variety of ingredients and mechanisms of action, such as active hydration or by reducing skin TEWL.[8] When the moisturiser is washed, cleaned, or wiped off the skin's surface, this effect is transient and is thus lost. Moisturizers are mostly categorised as

cosmetics in this way. The qualities of moisturizers' ingredients, which may include humectant, emollient, or occlusive compounds, are related to the advantages they provide.[9,10]

Cleansers

Cleansers are rinse-off beauty products that are used to get rid of excess sebum, dirt, and makeup from the skin. Products for cleaning can be offered in a variety of formats, including bars, foams, and liquids. Detergents are commonly used in formulations to encourage the removal of lipids. However, the high negative charge of soaps lowers the capacity of skin proteins to hold water, and using cleansers with high detergent content makes the skin feel stretched and dehydrated. Therefore, sensitive and dry skin cannot use these products. Additionally, after using cleaners with high detergent concentrations, the use of moisturising formulations is advised. Some formulations are made to provide additional skin benefits in addition to maintaining hygiene. Typically, cleansing milk contains humectant components that are emulsified in oil-in-water compositions. Since its formula allows for the dissolving of the contents without causing skin or eye irritation and leaves no oily residue after use, this type of cleanser is frequently used to remove makeup. Due to their ability to remove waterproof makeup and sunscreen residue that detergents are unable to remove, oil-in-water formulations are a big market trend. Finally, using micellar water to remove makeup and cleanse the skin is a common practice. Depending on the dissolution medium, these formulations contain micelles, which are amphipathic aggregates that are arranged to expose their miscible portions and shield their immiscible moieties. Micelles are dissolved in aqueous solution in micellar waters, which encourage cleaning through emulsification.[11]

Classification of cosmeceuticals

Different terms can be used with the phrase "cosmeceuticals." The definition is the same for each phrase, i.e. Cosmetics may be chemically made or biologically derived. The ideal ingredients for cosmeceuticals should be those that can be digested by skin and are safe, effective, new, stable, economical to produce, and all of the above. There is a wealth of literature on the active substances in cosmeceuticals. Active cosmetics, nutricosmetics, performance cosmetics, functional cosmetics, and dermaceuticals are some of the different names that can be used to refer to cosmetics.[12] Cosmeceuticals can essentially be divided into the following categories:

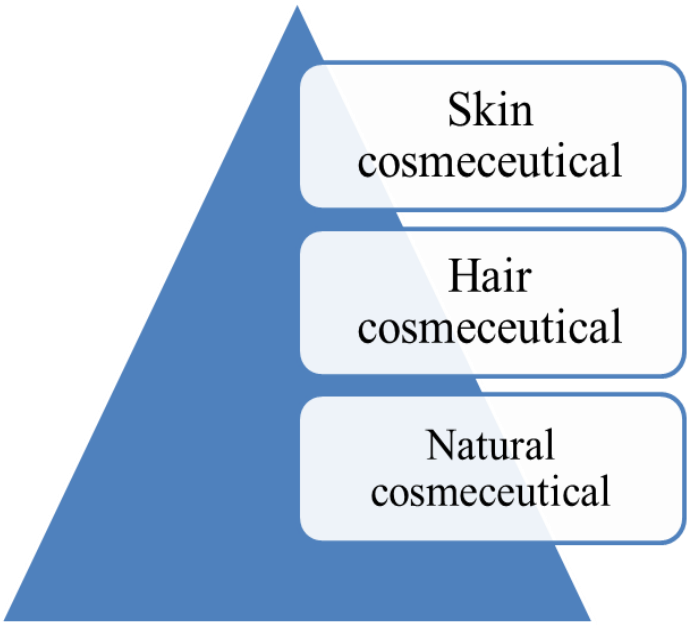

Figure 1 Classification of cosmeceuticals.

Cosmeceuticals indications[13,14]

Age-defying generally

Treatment of pigmentation-related conditions such as melasma or freckles

Treatment of pigmentation-related conditions such as melasma or freckles

Rhytide diminution

Anti-inflammatory

Weight loss

Hair expansion

Reduction of hair loss

Preservation of skin tone and complexion clarity

Basic Structure of the Skin

The barrier separating the body from its environment is formed by the skin and its derivatives, including hair and hair follicles, nails, and sebaceous glands. The skin is a complex organ made up of many different cell types. Skin has many roles that enable organisms to survive in a variety of settings, and these functions are largely influenced by structure and cell diversity. Skin serves as a barrier for mechanical, permeability, and UV light while defending the body against harmful physical, chemical, and biological substances. In addition, skin regulates body temperature and water loss, transmits sensory information, offers immunologic information, secretes hormones, cytokines, and growth factors, among

other things. The epidermis and dermis are the two layers that make up the structure of skin.[15]

Major Factors Affecting Skin Appearance

The skin serves as a barrier to defend against harmful physical, chemical, and biological contaminants because it is the outermost organ of the body. Additionally, because skin is a social organ, its look plays a significant cosmetic function in influencing every area of a person's existence, including their ability to reproduce and engage in social activity. Smooth skin surface, even skin colour, tone, and pigmentation, as well as favourable perceptions of health and attractiveness. The ageing process and exposure to environmental toxins, especially UV rays, are the main physiological changes of the skin that can have a negative effect on this tissue's look.[16]

Skin cosmeceuticals

Skin preservation and protection are crucial. The skin's barrier qualities can be changed by the environment, UV radiation, air pollution, and the natural ageing process. Ceramides, cholesterol, free fatty acids, triglycerides, cholesterol sulphate, and water are used to cement the stratum corneum cells of healthy skin.[17] This is what makes up the skin's lipid barrier. Dry, flaky, and rough skin that is readily irritated will result from damage to the stratum corneum barrier function. The ability of the skin's barrier function will be impacted by damage to the live epidermis.[18] 85 to 90 percent of the tissue in the skin is the dermis. Injuries to this layer, which gives the skin its structural support, can lead to wrinkles, stretch marks, or thin, saggy skin.[19]

Sunscreen

In order to minimise the effects of photoaging and protect the skin from UV rays, it is crucial to wear an effective sunscreen on a regular basis. Physical sunscreen deflects UV rays away from the skin, whereas chemical sunscreen absorbs them. Para-aminobenzoic acid (or its derivatives), cinnamates, salicylates, benzophenones, dibenzoylmethanes, anthraline derivatives, octocrylene, and homosalate are the main chemical ingredients in conventional sunscreens.[20] They work by absorbing UVB photons and attaching to skin proteins. A benzophenone called avobenzone can also block UVA rays [100]. Physical sunscreens use physical substances to scatter or reflect rays. The majority of them contain bismuth, titanium, iron, and zinc. Both titanium dioxide and zinc oxide are quite reflective. The additional benefit of submicron zinc oxide or titanium dioxide is that it transmits visible light while

reflecting UV rays, creating an undetectable sunscreen. It has been patented to use activated platelet factor in a sunscreen composition. This mixture is anticipated to help return damaged skin to its pre-damage state. Green tea's active ingredient, epigallocatechin-3-gallate (EGCG), has been shown to work well as a sunscreen. It has been demonstrated that caffeine from coffee and tea has an inhibitory effect on UVB-induced carcinogenesis.[21]

Mineral particles known as inorganic filters primarily reflect, scatter, and absorb UV rays. The two inorganic filters that are used in sunscreen the most frequently are zinc oxide and titanium dioxide. These photosensitive, insoluble mineral particles absorb UVB and UVA rays. Inorganic filters, on the other hand, are highly comedogenic due to their insoluble nature and form an opaque film that leaves a white trace when applied to the skin. These factors contributed to mineral sunscreens' long-term lack of commercial appeal.[22] Currently, this problem is solved by reducing the particle size using micro- or nanosizing procedures. The use of these techniques increases the particles' solubility and enhances the texture and applicability of the final compositions. However, the process of nanosizing reduces the particles' spectrum absorption peak, which has an impact on how well the goods they are utilised in perform. Therefore, formulations that contain the right blend of physical and chemical agents give the broadest spectrum of photoprotection, which has proven to be a significant problem for formulators.[23]

Retinoid

Retinoids are a group of lipophilic substances that include vitamin A (also known as retinol) and its synthetic and natural counterparts. All forms of vitamin A and its derivatives are ultimately converted to trans-retinoic acid in this tissue by endogenous enzymatic processes, making trans-retinoic acid the physiologically active form of vitamin A in the skin.[24] Retinoids can penetrate cell membranes due to their high affinity for lipids, and by interacting with various retinoic-acid receptors, they can control the activation of the genes and signalling systems that are involved in cell growth and differentiation. Retinoids are able to activate the cell cycle and control the metabolism and cellular turnover of skin cells by interacting with their nuclear and cytoplasmic receptors. Retinol applied topically to aged human skin stimulates epidermal keratinocyte proliferation, resulting in higher epidermal turnover and more effective desquamation. By enhancing the expression of type I collagen, fibronectin, and tropoelastin, as well as elastin fibre synthesis, hyaluronic acid expression, and dermal endothelial cell growth, retinoids also enhance dermal homeostasis. Retinoic acid

can also inhibit collagenase activity, which stops collagen deterioration. The clinical anti-aging efficacy of retinoids, which is associated with the reduction of wrinkles and fine lines as well as the enhancement of the overall texture of the skin, appears to be molecularly based on the modulation of these mechanisms. As a result, retinoid-containing topical anti-aging products have gained popularity.[25]

Antioxidants

Recent years have seen a rise in the serious study of the commercial use of flavonoids and radical scavengers as advantageous anti-aging and photoprotective components in cosmetic goods. In oils that oxidise quickly, an anti-oxidant slows down the rate of oxidation. When oils or other natural components are exposed to oxygen, oxidation takes place chemically. By slowing the rate of oxidation, antioxidants increase the shelf life of the formulation and the finished goods. The products will be preserved if an antioxidant is included in any composition that contains delicate oils such sweet almond, hemp, avocado, flax, or evening primrose.[26]

Cosmetics and technology

The use of technology is another contentious subject in the cosmetics sector. Technology and cosmetics are now more closely related than ever before as both become more advanced and accessible. In terms of developing ingredients and testing cosmetics, biotechnology has had a profound impact on the cosmetics sector. The usage of biologically produced materials, such as marine and plant-based products, has increased dramatically in the cosmetics sector. Additionally, fermentation-derived ingredients are becoming more widely used. The way that ingredients for cosmetics are tested for safety has also changed. Skin culture is used to create skin analogues in an effort to replace animal research. Delivery technologies are improving, with nanotechnology taking centre stage, to transport the substances to the skin more efficiently.[27]

Natural cosmetics

As previously mentioned, cosmeceuticals can be either natural or artificial. In skin care, sun care, and hair care products, a number of cosmeceutical active substances, whether natural or synthetic, have been examined. The focus of this section is natural cosmetics. As consumers everywhere place a greater emphasis on their health, wellbeing, and attractiveness, the idea of natural has given rise to heated controversy. Natural, organic, lack of artificial preservatives, and lack of animal testing are terms that are grabbing a lot of attention. Consumers are also

becoming more aware of the fact that not all products labelled as natural are actually natural. With their lengthy lists of frequently unintelligible ingredients, body care labels can be confusing. Consumers may find it challenging to distinguish between natural and chemically synthesised ingredients. Nine categories make up the natural body care segment: oral care, personal care and first aid, deodorants, hair products, body care kits, sets, and travel packs, aromatherapy and body oils, body care, skin care, and soap and bath preparations.[28]

Active Ingredients of herbal cosmetics

Some of the natural active ingredients used in cosmetics products today are listed below.

Papain

The dried latex made from papaya fruit contains papain (Carica papaya L). It has a proteolytic enzyme, which breaks down proteins, as well as other potential ingredients. In the food, pharmaceutical, and textile industries, papain is frequently used. It is a protease that is frequently utilised in applications involving food processing. It has also been used to treat wounds. It is employed in cosmetics to exfoliate keratosis skin.[29]

Aloe Vera

Considering that it is a cactus, the aloe plant contains about 75 distinct substances, including vitamins, minerals, enzymes, carbohydrates, anthraquinones or phenolic compounds, lignin, saponins, sterols, amino acids, and salicylic acid. The herb is currently most frequently utilised in the fields of skin care, cosmetics, and wound healing.[30] This plant, specifically its polysaccharides, have been linked to numerous biological activities, including antiviral, antibacterial, laxative, radiation protection, anti-inflammation, and immunostimulation. It has been demonstrated to trigger macrophages and quicken wound healing.[31]

Ceramide

All complex sphingolipids are biosynthesized through the use of the crucial intermediate ceramide. Ceramide has significant commercial potential in the cosmetics and pharmaceutical industries, including in the production of hair and skin care products, due to its significant contribution to maintaining the epidermis' ability to retain water. Ceramide-containing products are already widely available in the cosmetics industry, and their use has excellent results.[32,33]

Advantages of herbal cosmetics over synthetic

The most recent fashion and beauty trend is herbal cosmetics. Since natural products provide the body with nutrients, improve health, and provide satisfaction because they are free from synthetic chemicals and have comparatively fewer side effects than synthetic cosmetics, most women today choose natural products over chemicals for their personal care to enhance their beauty.[34]

The following are some benefits of utilising natural cosmetics that set them apart from synthetic ones:

Natural products

By virtue of their name, herbal cosmetics are supposed to be all-natural and free of any potentially dangerous synthetic chemicals that could hurt the skin. These products use various plant parts and plant extracts in place of conventional synthetic products, such as aloe-vera gel and coconut oil. They also include natural nutrients like Vitamin E, which maintains healthy, radiant skin. Aloevera, for instance, is a naturally occurring herbal plant species that is accessible and part of the liliaceae family. Consumers are becoming more and more concerned about ingredients like mineral oils and synthetic chemicals, and they want products that are more natural, free of harmful chemicals, and that emphasise the benefits of botanicals.[35]

Safe to use

Natural cosmetics are safer to use than other cosmetics. They have been dermatologists-tested and dermatologist-proven hypoallergenic, making them safe to use anytime, anyplace. People don't have to worry about developing skin rashes or itching because they are made of natural substances. As an illustration, the synthetic antioxidants BHA (butylated hydroxyanisole) and BHT (butylated hydroxytoluene), which are employed as preservatives in lipsticks and moisturisers, are closely related. BHA and BHT might cause adverse skin responses. BHA has been identified as a potential human carcinogen by the International Agency for Research on Cancer. Vitamin C and other natural antioxidants are present in herbal cosmetics.[36]

Compatible with all skin types

All skin types can use natural cosmetics. Whether you have dark skin or are fair, you may discover natural cosmetics like foundation, eye shadow, and lipstick that work for you. They can be used by women with sensitive or oily skin without compromising their skin's

condition. Coal tar is known to be a human carcinogen, so the main worry with individual coal tar colours (whether made from coal tar or synthetically) is that they may cause cancer. Coal tar-derived colours are widely used in cosmetics. However, natural colours made from herbs are safer.[37]

Wide selection to choose from

Although natural cosmetics are still a relatively young category in the cosmetics business, they already provide a wide range of cosmetics for all make-up enthusiasts to choose from. There are various naturally formulated cosmetics available, including foundation, eye shadow, lipstick, blush, mascara, concealer, and many more. Additionally, one can find locally produced natural cosmetics or those created by well-known international designers. Numerous herbal extracts are available, including Andrographis Paniculata (Kalmegh), Asparagus Racemosus (Shatawari), Boswellia Serrata (Salai Guggal), Asphalt (Shilajit), and others.[38]

Fits your budget

Natural cosmetics don't cost a lot. In some cases, these goods are less expensive than synthetic ones. During sales, they are presented at a reduced price and are sold for a low cost. Just conduct enough research to hunt for excellent bargains. According to a WHO estimate, 80% of the world's population relies on natural products for their healthcare due to the negative side effects and rising costs of modern medicine. Due to their accessibility, affordability, and relative safety, traditional herbal remedies are currently encouraged and recommended by the World Health Organization in natural health care programs.[39]

Not tested on animals

To make sure they are suitable for human use, several cosmetics are initially tested on animals. However, it is not necessary to test natural cosmetics on animals. Experts evaluate these natural products in labs using cutting-edge machinery without involving any animals.[40]

No side effects

Your skin may become irritated and break out from using synthetic beauty products. Your skin may become dry or oily as a result of them clogging your pores. One need not be concerned about them with natural cosmetics. The use of natural components ensures no negative effects; they can be used anywhere, at any time. For instance, herbal cosmetics are

free of parabens, the most common preservative used in cosmetics and a skin irritant. also thought to interfere with hormone function.[41]

Cosmetic vs drug

There are several somewhat different definitions of "drugs" and "cosmetics," however there are certain similarities that are detailed in (Table 1). Cosmetics are substances applied topically to the body to improve it temporarily while concealing a more serious deficit or imperfection. Instead of being a reaction to a medical need, its application is seen as cosmetic and lacking in depth arm relevance. A drug is defined in more complicated ways. A drug is typically a chemical substance that, when ingested by a living thing, alters normal function. Drugs are defined as "chemical substances used in the treatment, cure, prevention, or diagnosis of disease or used to otherwise enhance physical or mental wellbeing, for a limited duration or indefinite period of time" by the field of pharmacology. Each nation's government controls the public's access to drugs.[42]

OTC, or over-the-counter, drugs are sold by pharmacies.

Behind-the-counter (BTC) medications, which must be prescribed by a pharmacist but do not need a doctor's approval, and

Prescription-only drugs (PODs); only doctors with licences may prescribe these.

The Government's Medicines and Healthcare Products Regulatory Agency (MHRA) is in charge of making sure that drugs and medical equipment function properly and are acceptable safe. They are in charge of addressing complaints, conducting investigations, and providing public information.

The National Biological Standards Board (NBSB) was created in 1975 by an act of parliament and is a non-departmental public body. The board guarantees the following in order to assume responsibility for protecting and advancing public health.

Biotechnology and Cosmetic Ingredients

More ingredients for cosmetics have been created utilising biotechnology. The previously utilised for medication research recombinant proteins, growth factors, and cytokines are increasingly making their way into the cosmetic business. The following is a list of some ingredients made via biotechnology. This list is by no means complete. A biotechnological process is used to produce some ingredients, including hyaluronan (HA), a key component of skin moisture. Shortly after its discovery, the benefit of using HA in cosmetic formulations was understood, but its use in cosmetics was constrained by the difficulty of producing HA in

large quantities. In the past, HA was made from rooster combs. Biotechnology and genetic engineering developments have made it possible to produce HA in large quantities. Through the amplification of the HA synthase (HAS) genes, bacteria with increased HA synthesis have been created.[43] Another category of cosmetic chemicals that can be generated via biotechnology is growth factors. They can also come from plants and animals. Yeasts and recombinant genetic techniques can both be used to produce epidermal growth factor.[44] After being subjected to stress, heat shock proteins (Hsp) are a family of proteins that support cellular integrity. The cosmetics business is interested in Hsp70. The approach for skincare is to either induce Hsp70 or supply Hsp70 from a different source. Typically, biotechnology is used to create synthetic Hsp70 from yeast.[45] One of the organic molecules with a low molecular weight produced by halophilic microorganisms under hyperosmotic stress is ectoine. Enzymes, membranes, and entire cells can be shielded from the stressors brought on by salt exposure, heat, freezing, and desiccation.[46] The halophilic gram-negative bacterium Halomonas elongata is used in the biotechnological commercial production of ectoine, also known as bacterial milking. The heat shock proteins Hsp70 and Hsp70B' can also be expressed by ectoine in human keratinocytes.[47] Ectoine is now utilised in cosmetics and skin care products as a moisturizer.[48]

Cosmetic Delivery Systems

For cosmetic compounds to function properly, they must be transported to the area of action. The majority of substances interact in the lower stratum corneum or alter how epidermal or dermal cells operate. The components are included into the proper cosmetic delivery systems to make it easier for them to pass through the skin barrier. The creation of new synthetic surfactants and understanding of the mechanism underlying percutaneous absorption have the greatest influence on the development of cosmetic delivery systems.[49] Traditionally, complex emulsions of water dispersed in oil (w/o) or oil dispersed in water (o/w) have been used in cosmetic leave-on formulations. Night creams typically do not contain emulsions, while cosmetic day care products typically do. New galenical formulations have been developed today.[50]

Cosmeceuticals chemistry

It is crucial to ask three questions when requested to assess a new cosmetics item that makes a claim of having a positive physiological effect:

Can the active ingredient reach its intended target in the skin by penetrating the stratum corneum and delivering sufficient quantities there over a period of time that is consistent with its mode of action?

In the target cell or tissue of the human skin, does the active component have a specific biochemical mechanism of action?

Are the efficacy claims supported by peer-reviewed, double-blind, placebo-controlled, statistically significant clinical trials that have been published?

Can the active ingredient deliver sufficient concentrations to its intended Target in the skin over a time course Consistent with its acid-based mechanism of action through the stratum corneum?

The stratum corneum serves as an efficient barrier to the penetration of foreign chemicals and transepidermal water loss. To have the inkling that these active component marketing claims are not wholly supported by scientific reality, one need not advance to the stage of clinical trials. For instance, many cosmeceutical moisturisers contain hyaluronic acid, which can be applied topically. Hyaluronic acid does not appear to penetrate the stratum corneum, according to research. Although it increases skin's ability to hold water, does it have any other pharmacologic effects on human skin? Further study of this situation is required.[51]

Has the target cell or tissue in human skin a specific biochemical mechanism of action for the active ingredient? Is there a plausible biochemical or pharmacologic mechanism of action for this active ingredient to support the efficacy of the marketing claim, if the agent can satisfy the first requirement (penetration of the stratum corneum)? The product merits additional clinical testing if a plausible biochemical or pharmacologic mechanism of action exists and it can reach its target at adequate concentrations for extended periods of time. Some of these products might have previously undiscovered mechanisms, necessitating further study. For instance, vitamin K (phytonadione) is a cofactor in the enzymatic carboxylation of glutamate residues on a variety of hepatic enzymes that regulate blood clotting, which is a known biochemical mechanism of action in the liver. As a chemical that expedites the resolution of endogenous purpura (solar purpura) and iatrogenic purpura, vitamin K is presently being sold topically (after cosmetic procedures such as laser procedures). Red blood cells that have extravated and the byproducts of their haemoglobin breakdown that have been deposited in the dermis are referred to as purpuru. What is the vitamin K's skin-related mechanism of action? Until proof is provided that explains the mechanism of action, this question ought to

cast a shadow of doubt over it. Topical vitamins and antioxidants are one of the areas of cosmetics that attract the most interest. Vitamin A (retinol), Vitamin C (ascorbic acid), and Vitamin E compounds are among them (da – tocopherol). Both an antioxidant and an enzymatic cofactor, vitamin C serves a dual purpose. Research on ageing generally agrees that oxidative stress plays a significant role in the ageing process. Free radicals, reactive oxygen species that cause tissue damage and subsequent inflammatory reactions, are produced by UV light in the skin. More research is required despite a few articles that have been written about the effects of topically applied vitamins C and E on UV-induced erythema. There are many topical vitamin C treatments on the market, but formulation is challenging since the molecule oxidises quickly. When using topical vitamin C therapy, a dermatologist must consider the frequency of application, if the stratum corneum contains a reservoir, and whether the vitamin C enters the dermis quickly and remains there for an adequate amount of time. Can it mitigate some of the harm that UVA rays cause to collagen and elastin? Topical treatments may enhance epidermal concentrations of vitamins, but they are unlikely to increase dermal concentrations of vitamins beyond what can be provided orally. Both basic science and clinical research are needed in these areas.[52]

Regulatory aspects

Cosmeceuticals do not fall under any regulatory classification. FDA doesn't even acknowledge the term as an official product type. The Federal Food, Drug and Cosmetics Act (FDCA), which defines cosmetics as "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," however, governs the use of cosmetics. Cosmeceuticals must not be designed to diagnose, treat, mitigate, or prevent disease in order to avoid drug regulation. According to the FDA, the inclusion of certain ingredients that are widely recognised by the general public as therapeutic, marketing claims, and consumer perceptions of a product's intentions can all result in drug regulations. As a result, cosmeceuticals now find themselves in a situation similar to that of functional foods and dietary supplements, necessitating the same level of marketing and formulation care. The Food and Drug Administration (FDA) review and approval process is very stringent when it comes to drug claims, but cosmetic claims are not required to go through this process. When it comes to "cosmeceuticals," there is a lot of misunderstanding. Although there isn't a specific legal category for cosmeceuticals, the term has come to be used and accepted to describe goods that fall somewhere between cosmetics and pharmaceuticals. Cosmetics are

not covered by the Federal Food, Drug, and Cosmetic Act and are not subject to FDA review. Consumers frequently find it challenging to verify "claims" made about the actions or efficacies of cosmeceuticals unless the product has been given the FDA's or a similar agency's seal of approval. Some experts are advocating for stricter regulation of cosmeceuticals, which would only call for safety proof—something that is not required for cosmetics. Some nations have product categories that fall under both the cosmetics and drug categories, such as Japan's quasidrugs, Thailand's controlled cosmetics, and Hong Kong's cosmetic-type drugs. The laws governing cosmeceuticals in the USA, Europe, Asia, and other nations have not been unified.[53]

CONCLUSION

The use of cosmeceuticals has significantly increased in recent years, which has expanded the choice of products available to doctors to improve the appearance of patients with skin issues. Along with the population's average life expectancy, the field of research into skincare and personal care products is expanding. New products that claim to improve skin quality and delay ageing are released onto the market every day. Many of the ingredients added to these formulations appear to offer promising activities with regard to prevention and mitigation of aspects related to ageing in general, and there is a wealth of information available on the mechanisms of action of the various ingredients. Vitamins, sunscreens, hydroxyl acids, and many other cosmetics have demonstrated their effectiveness in treating skin conditions and improving the texture of the skin. The interaction between skin and cosmeceuticals, which may potentially be influenced by environmental factors, must be studied in cosmeceutical clinical studies. Future cosmetics and skincare product formulations are expected to get more complex. In order to produce cosmeceuticals that could aid in increasing body mass, nail and hair growth, cosmetic companies are figuring out ways to deliver small-dose ingredients that are exempt from medical regulations and to incorporate steroids and hormones into lip balms. As more chemicals with real biological activity are developed and tested, government regulatory agencies will also face new difficulties.

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Conflict of interest

The Authors declare no conflict of interest.

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