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**THE TRENDS AND DEVELOPMENT IN THE COSMETIC TECHNOLOGY: A
REVIEW**

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ABSTRACT

Cosmeceutical is a term which is employed for the combination of cosmetic and pharmaceutical and the field of cosmetic technology is robustly dealing these days with the advancement and research of these cosmeceuticals. Cosmeceuticals are basically cosmetic products only but these also possess a drug like activity. Thus they are termed as cosmeceuticals. They were not recognized in the earlier decades but came into existence when a researcher “Kilgman” coined this term. The utilization and popularity of these products expanded globally, primarily after the year 1996. The present paper is an attempt to enlighten the recent work and advancement which is being carried out on cosmeceuticals and how they are proving themselves to be a promising area of interest in the field of cosmetic technology.

KEYWORDS

Cosmetic Technology, Cosmeceuticals and Role in Dermatological Conditions.

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INTRODUCTION

Cosmetics are the substances which are generally used to beautify and enhance the properties of skin. Somewhere around 4000 BC, the first use of cosmetic substances were reported¹. The studies have proved that these substances have a positive effect in treating many of the dermatological conditions associated with individuals. These are also responsible for fulfilling the nutritional needs of human skin, thus making the skin more lustrous and healthy. These mainly act in decreasing the rate of age related degenerative skin diseases acting topically on the skin². The biological activity of the

skin is generally altered by the ingredients present in such type of preparations³. Globally, the growth rate of this segment of products is increasing enormously and it is now a well accepted fact that these products do results into positive health benefits⁴. The regulatory bodies like Food and Drug Administration (FDA) are still away from such products and they do not require any regulation by such bodies and thus, cosmeceuticals are not still recognized by these governing bodies. The Food, Drug, and Cosmetic Act have quoted the definition of cosmetic preparations, 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.” The line of products which are included in cosmetics are chiefly shampoos, hair color, nail lacquers, lipsticks, preparations meant to be applied on eye and face to beautify them, toothpastes and deodorants. The cosmeceuticals which have been considered as a novel term forms a midway between both cosmetics and drugs because these consist of medicinal agents to mitigate, prevent or change any biological function of skin.

Mechanism of Action

These agents mainly act by enhancing the growth of collagen by blocking the deleterious effects of free radicals. In doing this, the structure of keratin remains maintained in the best possible way, thus promoting the health of skin and increasing its texture.

The large scale and small scale pharmaceutical houses along with biotechnological industries are constantly engaged these days in the manufacturing of cosmeceuticals. The development and advancement in the science of cosmetic technology together with in depth knowledge of the skin study has resulted into the development of some more recent biologically active compounds. These are continuously incorporated and utilized by the industries in inventing some newer cosmeceuticals⁵.

Significant Classes of developed Cosmeceuticals

The efficacy of cosmeceutical products is being increased day by day with the innovative efforts of researchers in the cosmetic labs. Newer products

have been introduced in the market proving to increase the health of skin and skin related problems. The design of products like moisturizing agents, skin lightening agents, sunscreen agents, anti-wrinkle preparations and many other formulations have been now entirely enhanced with addition of drug like substances for a cosmetic as well as pharmaceutical response⁶. A lot of work is being done in the present era to explore more of their hidden benefits and in identifying newer generations of ingredients.

The types of newly introduced cosmeceuticals which are playing a major role in changing the face of cosmetic industries are following:

Anti-Wrinkle Agents

These are the agents that help in reducing the appearance of fine lines or larger wrinkles present on the surface of skin. Different mechanisms are involved in the working of these agents, one of the important mechanism is the reduction in facial muscles tightening, stimulation of the production of proteins in the connective tissue (e.g. collagen, elastin), and the reduction in the loss of water content from skin, thus maintain the proper hydration of skin⁷.

Sunscreen Agents

These are the agents in which the maximum emphasis on research is been given because these agents hold an important position in the growth of cosmetic industries. Several skin disorders are previously reported to relate with the harmful effect of skin rays. The maximum exposure of these harmful rays are during the summer season and the sale of sunscreen agents are thus at the peak during this season. These agents are strongly recommended by the leading dermatologists globally as the single most important formulation that should be applied regularly on the skin. There are two kinds of sunscreen agents: Chemical and Physical. Chemical sunscreen agents protect the skin from the sun by absorbing the ultraviolet (UV) and visible sun rays. The physical sun screen agents are those which reflect, scatter, absorb, or block the sun rays. They also have an important role in prevention of skin cancer⁸.

Moisturizing Agents

Certain diseases of skin like psoriasis, dermatitis, eczema, dry skin poses a deleterious effect on skin and to prevent such diseases, moisturizing agents are employed. These agents help in reducing the loss of moisture content from the skin and keep it hydrated. Stratum corneum is the layer of skin which acts like a barrier and water generally gets evaporated from this layer at a very rapid rate. These agents generally consist of a oily base and help in maintaining the fluidity of stratum corneum, thus preventing the skin from getting dehydrated. The drug like agents are now days incorporated in these agents which result into a medicinal effect also apart from giving a cosmetic effect. Such agents primarily consist of humectants which form a layer on skin when applied topically, thus maintaining the moisture content up to the required level³.

Anti-Ageing Agents

Considering the increasing number of aging population all over the world, the desire to remain young, and the frequent advancements made in decreasing or inhibiting the rate of natural process of aging, the market for anti-aging products is increasing tremendously globally. The understood mechanism by which these agents act is that they have the ability to find and destroy the free radicals, thus protecting the skin matrix by inhibiting the enzymatic degradation. The other way by which they promote their action is by enhancing the collagen synthesis in the skin, thus affecting skin elasticity and tightness⁹. The popularity and use of Anti-ageing agents can be appreciated from the Figures No.1 and Figure No.2¹⁰.

Antioxidants

The main cause of skin disorders is the production of reactive oxygen species (free radicals) in the skin. Antioxidants play an important role in reducing this free-radical damage in the skin, and therefore help in preventing the mutilation at cellular level. Further these agents also inhibit the inflammation of the skin, and protect against photo damage and skin cancer which is a serious challenge for health experts¹¹. Most of the leading

industries of cosmeceutical products contain antioxidants in order to generate promising products.

De-Pigmenting Agents

Possessing a more fairer and beautiful skin, is a desire of every women in this present era and this want could be fulfilled these days by the usage of de-pigmenting agents effortlessly. These are also known as skin lighteners and the market sale of such products is enormous. A very significant ingredient of these agents is hydroquinone which is generally found in the concentration of 1.5-2% in such agents as recommended by the US-FDA. Some more common ingredients used in such preparations are Vitamin C, kojic acid, liquorice etc¹¹.

Skin Cleansers

The stratum corneum of the skin is responsible for secretion of sweat and other decomposed products as it consist of sweat and sebaceous glands. The skin must be cleaned of tenly to remove the unwanted materials like dirt, pollutants and foul smell from the skin in order to make the skin healthy. Much of the effort is been given on the research and development sector to produce these products. Many of the newer formulations have been already developed but one recent advancement which requires an appreciation here is the use of Nanotechnology in preparing these formulations. Nano Cyclic Inclusive produces Nano Cyclic cleanser pink soap which is a precisely balanced mixture of nanosilver and natural ingredients. A report published regarding this states that it kills harmful bacteria and fungi, helps in fighting and reducing acne, and diminishes age spots and reduce the chance of sun burns¹².

Exfoliants

Their main hidden action lies under the fact they help in removing the upper layers of the epidermis. AHA (Alpha Hydroxyl Acid) is an important constituent which is found in these preparations. It works by thinning the epidermal stratum corneum, adjacent to the stratum granulosum layer of the human skin. Exfoliants result into an enhanced quality of skin and also cause reduction in signs of ageing and dyspigmentation¹³. These are

responsible for removal of old dead cells from the skin chiefly from the outermost layer of the skin, thus giving it a newer and improved look.

Benefits of Cosmeceuticals

The benefits of cosmeceuticals have been realized from decades. The studies as well as market research done in many of the studies have already labeled these substances as the fastest growing segment globally. They definitely possess the qualities and attributes which enhance the beauty and appearance as well as improve the self esteem of an individual. Some of the important benefits provided by these preparations are enlisted below:

Functional Benefits

It can be appreciated that the cosmeceuticals such as hand wash or soap containing an antiseptic agent, is recommended by physicians all over the world. These help in reducing the rate of food borne diseases which generally spread from infected pathogens present in our hands. Many of the respiratory diseases and common disorders like diarrhoea could be prevented by these preparations, thus providing significant functional benefits. Further the members of dental association in each country propose the use of fluoride containing toothpastes so that the incidence of dental caries, plaque and many other harmful oral disorders could be prevented. It could also be appreciated that an imperative category of cosmeceutical agent is sunscreen agents on which several investigation is being carried out these days. These have drastically reduced the emergence of skin cancer globally, thus proving to be another vital benefit²³.

Emotional Benefits

Apart from providing physical and functional benefits, recent studies have signaled that the use of cosmeceuticals has influenced the overall quality of life in individuals. These are responsible for increasing the self-confidence, esteem and many such attributes in individuals. They are also found to be as mood enhancers and help in boosting the love life and liveliness in population. Renfrew Centre of Foundation (RCF) conducted a study and surprisingly found that women are wearing makeup because they like the way it makes them look, and

because the use of cosmetics makes them feel nice. Further numerous studies have established results that wearing cosmetics can improve people's self confidence and sense of self²³.

Development of Cosmeceuticals

The ideas and origin of generating cosmeceutical product basically comes from the following sources:

- Scientific Advances in Cosmetic Technology
- Changes in Consumer Preferences And Outlook
- Continuous Industry Modernization

The cosmetic engineers and researchers are continuously putting their best efforts to advance the entire concept and working of modern cosmeceuticals. Bearing in mind the innovative ideas, these engineers are constantly designing and creating the original formulas, determine the packaging and trying best to ensure the stability as well as safety aspects of these preparations.

Regulatory Aspects of Cosmeceuticals

The term "Cosmeceutical" is not regulated or governed by any of the regulatory bodies. The Food and Drug administration (FDA) have not even recognized the term cosmeceutical till now. But an important point of consideration here is that the FDA has strict regulations on cosmetic products from the past. Many of the recent reports came into existence which have publicized that the FDA has taken actions against those manufacturing companies who are producing and marketing their products as cosmetics only but are claiming falsely that a particular product have medicinal effect for a particular disorder. Stringent proceedings and warnings have been given to such manufacturers for the inclusion of unapproved new drugs in their products. Some of the noteworthy cases reported in which warning letters have been issued to the manufacturers by USFDA, are enlisted²⁴.

- "Rosaliac AR Intense", a product manufactured by L'Oreal came into the market claiming that it decreases the incidence of redness of skin by reducing the size of blood vessels.

- “Mela-D Pigment”, also manufactured by L’Oreal claimed to consist of constituents which could reduce the process of ageing and reduce the incidence of dark spots.
- StriVectin, a leading cosmetic company was also warned for its potent wrinkle reducing treatment and TL advanced tightening cream.
- A letter was issued to Be Natural Organics for its product named as “Calendula Cream Soap” which claimed to treat eczema. “Amaretto Body Scrub” was also produced by this company which claimed to help in draining the lymph nodes and increase the blood circulation in skin²⁵.
- Reviva Labs Inc. on May 10, 2016 was issued a letter by USFDA regarding its production of “Nasolabial Fold Multi-Peptide Cream” which claimed to increase the volume of fatty tissues and decrease the incidence of brown spots and discoloration²⁵.
- Skin Biology Inc. was warned for the manufacturing and marketing of “BioHeal Cream” which claimed to treat eczema in few days. “LacSal Serum” and “Exfol Serum” claimed to reduce acne in suffered individuals²⁵.
- Allure Laboratories Inc. was warned for its product labeled as “Mascara” which claimed to stimulate the hair follicles and increase the length of eye lashes²⁵.
- Cell Vitals, a leading cosmetic manufacturer in US was warned against its product “Reluma Advanced Stem Cell Facial Moisturizer” which claimed to increase the fibroblast cell growth and in increasing collagen, elastin growth²⁵.

Table No.1: List of recently marketed cosmeceuticals¹⁴⁻²²

S.No	Marketed Cosmeceutical	Major Constituents	Utilization	Manufacturer
1	Embryo Re-vitalizer cream	Ginkgo	Antioxidant that smoothes restores and promotes glossy appearance	Embryo
2	Neocutis Biocream Bio-restorative Skin Cream	Growth factors (GFs) and cytokines	Antiageing	Neocutis
3	Skin Ceuticals Retinol	Retinol	Antiwrinkle	Skin Ceutical
4	NIVEA Q10 Plus Antiwrinkle Day Cream	Coenzyme Q10	Antiwrinkle	Nivea
5	Garnier Moisture Match	green tea extract, citrus extract, camellia oil	Moisturizing	Garnier
6	Heliocare Advanced Cream	Extract from Polypodium leucotomos	Sunscreen	Heliocare
7	Aveeno Positively Radiant Cream	Soy extract and Niacinamide	De-pigmenting	Aveeno
8	Neutrogena Water Boost Hydro Gel	Hyaluronic Acid	Hydration and Tightening effect	Neutrogena
9	Collagen Moisture Filler Day Lotion	Collagen	Moisturizing and Hydrating	Loreal Paris
10	Hydra Energetic Extreme Cleanser	Glycerin, Stearic Acid, Charcoal Powder	Skin Cleanser	Loreal Men Expert
11	Olay Eyes Ultimate Eye Cream	Hyaluronic Acid	Dark Circle Remover	Olay
12	Olay Total Effects Nourishing Cream Cleanser	Niacinamide, Isopropyl Palmitate	Skin Cleanser	Olay

13	Garnier Multi Action Face Cream	Pure Lemon Extract	Fairness Action	Garnier
14	Garnier Pure Active Exfoliating Face Scrub	Raw Apricot Extract	Exfoliating Action	Garnier
15	Apothederm Stretch Mark Cream	Heptapeptide-7, Licorice	Reduction in stretch marks	Skin Oracle

Table No.2: Case studies in which warning letters were issued to manufacturers

S.No	Name of Manufacturer	Name of Product	Counterfeit Claim
1	L'Oreal	Rosaliac AR Intense	Decreases redness of skin and reduce size of blood vessels
2	L'Oreal	Mela-D Pigment	Reduce process of ageing and reduce dark spots
3	Stri Vectin	Wrinkle reducing treatment cream	Reduces the incidence of wrinkles
4	Be Natural Organics	Calendula Cream Soap	Eczema
5	Be Natural Organics	Amaretto Body Scrub	Increase blood circulation in skin
6	Reviva Labs Inc	Nasolabial Fold Multi-Peptide Cream	Increase volume of fatty tissues in skin
7	Skin Biology Inc	Bio Heal Cream	Eczema
8	Skin Biology Inc	Lac Sal Serum, Exfol Serum	Reduce the incidence of acne
9	Allure Laboratories Inc.	Mascara	Stimulation of hair follicles
10	Cell Vitals	Reluma Advanced Stem Cell Facial Moisturizer	Fibroblast cell growth

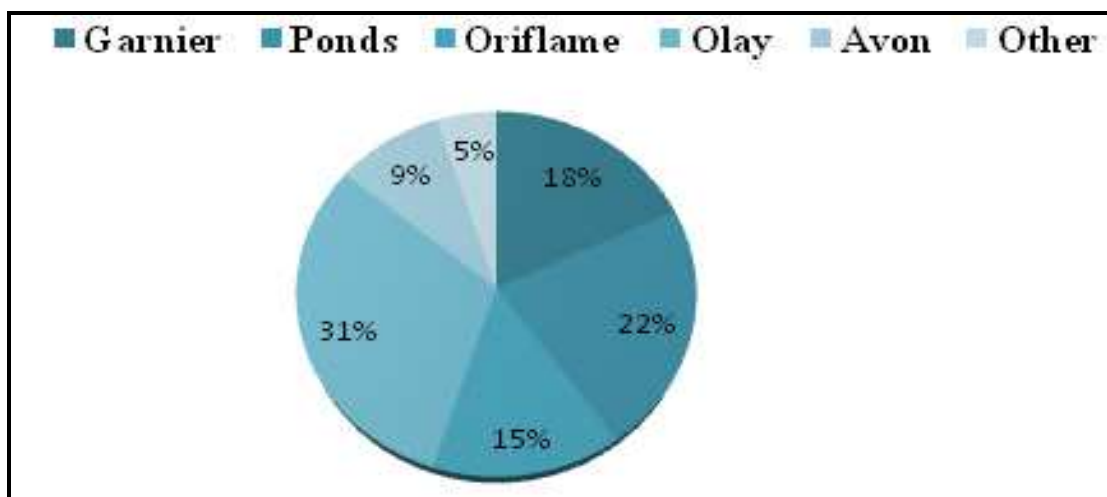


Figure No.1: Percentage distribution of anti-ageing cosmetic brands

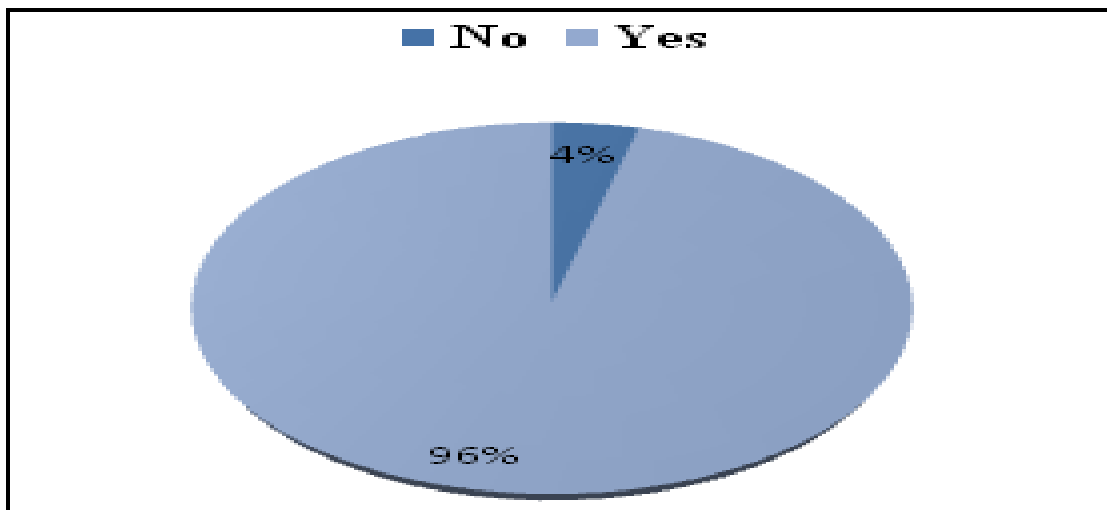


Figure No.2: Percentage of women using anti-ageing cream

I. The Safety of Product and Compliance With Regulatory Aspects: This requires the selection of ingredients, selection of final formula and the choice of packaging to make sure the safety of all users.



II. Efficacy Evaluation: It ensures that the claims which have been put by the manufacturers regarding the cosmetic products meets to its totality and also meets well with the expectations of consumers.



III. Microbiological Aspects: Specific tests are conducted to select the optimum preservative system so that the shelf life of cosmetics could be increased by them.



IV. Evaluation of Stability: It ensures that the cosmetic formulation and the packaging material is fully compatible so that the stability of the product may be maintained throughout its life.



V. Development of Process: Includes the scaling up of cosmetic product from a small scale lab instrument up to the entire large scale manufacturing unit, thus ensuring the most promising quality control of that cosmeceutical wherever it is manufactured globally.



VI. Supply Chain: Involves the purchasing of materials to make finished cosmeceuticals which includes the purchase of starting materials, packaging materials and the labeling requirements so that the products could reach to the retailers and customers in required quantity and quantity.

Figure No.3: Activities done before a cosmeceutical reaches to the market

CONCLUSION

Cosmeceuticals are the products that contain some active component which act on the cellular structure of skin. When applied topically, these offer some great benefits which could be therapeutic, disease combating or healing. Globally, the advancement in the cosmetic technology is enormous and this segment of industry is expanding immensely. The term "Cosmeceutical" is not yet recognized by any regulatory body and sometimes it may also be misleading for putting forward some false claims by the manufacturers. The present trend towards the acceptance of cosmeceuticals worldwide, and its efficient salutary properties proves it to be a worth of use. Given appreciation to all of these factors, it could be realized that the future of this segment is massive.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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