Potential Cosmeceuticals From Marine Constituents

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Abstract: Cosmetic pharmaceuticals, or cosmetic goods with drug-like qualities, are the most recent innovation in the pharmaceutical industry. Klingman coined the term "cosmeceuticals." There are many, and they are very different, marine resources. As a result, marine components have a variety of possible applications in the cosmetics industry, including as active ingredients, excipients, and additives. Some of the active marine sources used to create cosmeceuticals include sea weeds, marine fish, phytoplanktons, sponges, corals, sea mammals, fungi, bacteria, and mollusks. Cosmetics made from marine resources provide a variety of advantages, such as antioxidant activity, skin whitening, moisturising, de-pigmentation, and anti-aging. The market is flooded with cosmeceuticals that contain marine ingredients. This review focuses on the potential of marine components, a subject that has drawn academics' interest in recent years.

Keywords: Cosmeceuticals, marine, seaweeds, corals, phytoplankton

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Introduction

Cosmetics are items used to clean and enhance the skin. About 4000 B.C., the Egyptians were credited with using this cosmetic for the first time. Pharmaceuticals, often known as drug products, are generally believed to include anything that modifies the structure or operation of the entire body in the course of preventing, reducing, treating, or curing disease. Cosmetics are products that use active ingredients and excipients that are ideal for different types of skin to improve the morphology, structure, and appearance of the skin (normal, oily, combination, sensitive, etc.). The word "cosmeceuticals," which combines these two terms on purpose, intends to give the cosmetic product drug-like effects. Given that his invention first appeared on the world market in 1996, Klingman is occasionally referred to as the "Father of Cosmetics."[1] Several scientists have been investigating the potential of marine natural chemicals over the past few years. The expanse of our seas and the almost astonishing amount of biodiversity in the marine environment have encouraged researchers to delve into the therapeutic potential of secondary metabolites originating from marine organisms.[2] Marine sources contain a number of chemicals with anti-inflammatory, anti-allergic, anti-bacterial, anti-aging, and anti-wrinkle characteristics. The majority of cosmetics derived from marinesources include extracts or components from marine sponges, seaweed, fish, turtles, corals, phytoplankton, sea fennel, etc.[3]

Active agents from the marine source used for the preparation of cosmeceuticals

- Sea weed (EEB extract)
- Marine sponges
- Marine fishes (shark, jelly fish etc.)
- Corals
- Phytoplankton
- Crab

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Sea mammals
Marine fungi and bacteria
Mollusces (pearl oyster)

Sea weed
Invasive species working together will aid in the production of organic, environmentally safe cosmetic ingredients.⁴ There are three distinct types of seaweed or algae: red, green, and brown algae. The use of seaweed-derived ingredients in cosmeceuticals has dramatically increased in recent years as a result of the numerous scientific studies that have shown the potential skincare benefits of the bioactives from seaweeds,⁵ Carotenoids, fatty acids, polysaccharides, phlorotannins, vitamins, sterols, tocopherol, phycobilins, and phycocyanins are some of the seaweeds that have drawn attention because of the variety of activities they can do.⁶,⁷,⁸,⁹,¹⁰

Here are a few instances:
› Agar, which is derived from the seaweed species Pterocladiella, Gelidium amansii, Gracilaria, and Pterocladiella and possesses thickening and antioxidant properties.⁹
› Alginate is a thickening and gelling agent made from brown seaweeds that is extremely stable.¹¹,¹²,¹³
› Fucoidans with photoaging-inhibiting properties were found in Ascophyllum nodosum, Chnoospora minimum, Ecklonia maxima, Hizikia fusiforme, Saccharina japonica, Sargassum hemiphylum, Sargassum horneri, Sargassum polycystum, and Sargassum vachellianum. Carrageenans, which have anti-inflammatory, anticancer, and anti-aging effects.¹⁴

Fig. No. 1 Different types of seaweed/micro algae; A and D represents Red algae, B and E represents Green algae and C and F represents Brown algae.

Marine sponges
Sponge bioactive metabolites are used to make a wide range of active ingredients for cosmeceutical products. The main four divisions of marine sponges are Calcarea (calcareous), Hexactinellida (horn sponges), Demospongiae (coralline), and Sclerospongiae (glass sponges).
› The list of marine active ingredients used is as follows: Wound healing uses collagen produced from C. reniformis.¹⁵ ethyl acetate-based R. globostellata and S. inconstans extracts with antioxidant properties.¹⁶
› Geodin A, which was generated from G. japonica and possessed skin-whitening characteristics, was discovered. Acne is treated using A. cavernosa extracts in methanol, ethanol, and hexane.¹⁸ The osirisynes A, B, E, G, H, and I have anti-aging characteristics that come from Haliclona species.¹⁹ The Phorbas species-derived gaganin D exhibited the capacity to lighten skin.²⁰
› Other marine sponges include Callysponge siphonella, Callysponge sp., Fascaplysinopsis reticulate, Niphates forbesi, and Cylindropyrgia kisokafortuna.

Fig. No. 2 Different types of Sponges; A-Calcarea (calcareous), B-Hexactinellida (horn sponges), C-Demospongiae (coralline), and D-Sclerospongiae (glass sponges).

Marine fishes
In marine fish, there are lots of proteins and peptides, two physiologically active compounds. Collagen is the main structural protein present in
connective tissues and fish bones. Because it has the ability to scavenge free radicals, collagen derived from marine sources is appropriate for use in the formulation of skin care products. The collagen obtained from marine fish is employed in cosmetic goods because of its better mechanical strength and reduced odour. These compositions’ effects on skin firming and hydration were also assessed. The findings revealed that serum formulations had quicker and greater moisturising results.

Examples of marine fishes used for collagen extraction include Paralichthys olivaceus, Sebastes schlegeli, Lateolabrax maculatus, Pagrus major, jelly fish, Mystus macropterus, Saurida spp., Trachurus japonicus, Mugil cephalis, Cypselurus melanurus, Dentex tumifron, etc.

A component that is required for various cosmetic items can be found in jellyfish mucus. Since jellyfish possesses significant anti-aging effects, the cosmetics industry can intervene and help the fish population grow by including jellyfish in the development of anti-aging beauty goods. Scientists have replicated jellyfish cells in peptides and combined them with beauty treatments to cure and prevent DNA damage, encourage our skin cells to act young and regenerate, and promote DNA repair.

Corals are marine invertebrates that are part of the Anthozoa class of the phylum Cnidaria. Typically, they form dense colonies that are made up of multiple, identical individual polyps. Corals are used in numerous skin care products, including sunscreen, anti-aging products, acne treatments, cleaning agents that incorporate minerals to function as abrasives, powders, deodorants, and lipstick preparations. Soft corals that are abundantly developing along the seafloor produce ethanolic extracts that can be utilised to reduce melanin formation safely.

**Phytoplankton**

Microalgae, also known as phytoplankton, have chlorophyll and require sunlight to exist and grow, making them similar to terrestrial plants. Diatoms, dinoflagellates, and cyanobacteria are a few of the important groups of this phytoplankton. Microalgae extract with anti-aging and antimicrobial effects. This category will include functional antioxidants, polysaccharides, alginates, and carotenoids that support the health and appearance of the skin in cosmetics. Such examples are plasmids, carotenoids, cyanobacteria, microalgae, polyunsaturated fatty acids, and tetrapyrrrole. Laminaria ochroleuca, Chlorella vulgaris, Asparagopsis armata, and Asciophyllum nodosum are a few of the marine species found in 27% of the cosmetics for sensitive skin (microalgae).
used as preservatives in food, cosmetics, and pharmaceuticals. Since turtle fat contains a lot of vitamin E, it is boiled to extract the oil, which is then used to produce cosmetics. In England, it’s utilised in cosmetics like bath soaps, lotions, skin creams, and nail creams. [3]

Fig. No. 6 Few examples of Sea Mammals: A- Sea lions, B- Dugongs and D- Whale

Marine fungi and bacteria
Due to their photoprotective, anti-aging, antimicrobial, anti-oxidant, and moisturising properties, polyketides, alkaloids, peptides, proteins, lipids, mycosporines and mycosporine-like amino acids, glycosides, isopenooids, and hybrids are a few marine bacteria and fungi-derived compounds that have great potential in cosmeceuticals and cosmetics. The potential of marine microorganisms as a source of skin-whitening compounds has not yet been fully explored. It was shown that the tyrosinase inhibitor methylene chloride, which reduces melanocyte pigmentation, is produced by sea bacteria like Pseudomonas. [35] Most marine fungi, about one-third of them, are found in associations with algae. [38]

Molluscs
Treatments for a wide range of disorders use molluscs that have a multitude of secondary metabolites with different effects. They also showed anti-inflammatory, antiviral, and antioxidant effects and are used in the production of cosmetics. [37]

Fig.No.7 Examples of Mollusces: A-Sea Butterflies, B-Slugs, and C-Snailes

<table>
<thead>
<tr>
<th>SL. NO.</th>
<th>PRODUCT NAME</th>
<th>BRAND NAME</th>
<th>MARINE INGREDIENT USED</th>
<th>PROPERTIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Eternal Cream</td>
<td>SKEYNDOR</td>
<td>Oil soluble marine fennel extract</td>
<td>Nourishes skin Compensate the loss of skin volume</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Fights early signs of aging</td>
</tr>
<tr>
<td>2</td>
<td>Collagen Nutrition Cream</td>
<td>IT’S SKIN</td>
<td>Marine collagen from scales of fish living in deep sea</td>
<td>Firms skin Reduces wrinkles Balances oil and moisture</td>
</tr>
<tr>
<td>3</td>
<td>Skin Fuel Skin Elixir</td>
<td>WELLBEING NUTRITION</td>
<td>Japanese marine collagen peptides</td>
<td>Fortifies hair and nails Reduces signs of aging</td>
</tr>
<tr>
<td>4</td>
<td>Algae Vitalizer Ampoule</td>
<td>BABOR</td>
<td>Planton extract</td>
<td>Moisturizer</td>
</tr>
<tr>
<td>5</td>
<td>Souttle Marine Cleansing</td>
<td>PHYTOMER</td>
<td>Algae extract</td>
<td>Brighten skin tone Detoxifies skin</td>
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<td></td>
<td>Foaming Cream</td>
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</tr>
<tr>
<td>No.</td>
<td>Product Description</td>
<td>Brand</td>
<td>Key Ingredients</td>
<td>Benefits</td>
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<tr>
<td>6</td>
<td>Translucent Powder</td>
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<td>STAY QUICKRY</td>
<td>Pearl, Pearl powder and Pearl Protien</td>
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<td></td>
<td></td>
<td></td>
<td>Easy application</td>
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<td>7</td>
<td>Pearl Whitening Face Cream</td>
<td>JOVEES</td>
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<td>Pearl powder</td>
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<td></td>
<td></td>
<td></td>
<td>Face whitening</td>
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<tr>
<td>8</td>
<td>Biomarine Seaweed Skin Correctening Moisturising Fluid</td>
<td>NUXE</td>
<td></td>
<td>Seaweed Extract</td>
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<td>Moisturizer</td>
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<tr>
<td>9</td>
<td>Algo Mist Hydrating Seaweed Facial Spray</td>
<td>RECEPECHAGE</td>
<td></td>
<td>Laminaria Digitata seaweed extract</td>
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<td>Moisturizer</td>
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<td>Cell renewal</td>
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<td>10</td>
<td>Matte Liquid Lipstick</td>
<td>BRENNTAG</td>
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<td>Jelly Fish Extract</td>
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<td>Long lasting Lubrication</td>
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<td>Mattifying</td>
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<td></td>
<td></td>
<td></td>
<td>Protects and soothes lip</td>
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<td></td>
<td></td>
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<td>Waterproof</td>
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</tbody>
</table>

**Table No. 1** Examples of some Marketed Cosmetics which contains Marine Ingredients

**The benefits of marine cosmetics**

Supply ingredients for skin care products that are both scientifically and environmentally sound.

Provides vitamins, minerals, and UV protection for the skin.

May be utilised in cosmetics as a cleansing, moisturising, and antioxidant ingredient.

Strong marine components help to hydrate, firm, slim down, add shine, and protect the skin.

Gelatin and collagen made from marine sources have superior health benefits and fewer adverse effects.

Good source of secondary metabolites, used to treat and cure a variety of diseases.  

[3,10,37]

**CONCLUSION**

Sea life has the ability to produce unique compounds. Marine-derived cosmetics offer a range of health benefits. Many of the elements derived from marine sources could be used in cosmetics. Currently, companies that produce cosmetics must use marine-based components. Marine diversity has drawn the attention of researchers and the beauty business recently because it is a field that is being researched.

**REFERENCE**