



# Glow From Within: Nutricosmetics In Daily Beauty Care

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## **ABSTRACT**

Nutricosmetics are a distinct category of products and bioactive ingredients that serve as dietary supplements aimed at the maintenance of skin, hair, and/or nails while promoting beauty from within. Unlike cosmetics, which sit on the surface, nutricosmetics work from within providing support for essential nutrients that can influence the way we look.

This approach has become the booming trend in the global beauty industry, reflecting consumer demand for treatment that is advocated as all-rounded and sustainable. Today's consumers have become more cautious than ever in pursuit of safe natural and functional food-based compounds that contribute to beauty by further boosting their health. It is this cultural revolution that has helped nutricosmetics gain greater traction. Collagen, peptides, proteins, vitamins, carotenoids, minerals, omega-3 fatty acids, and a broad spectrum of botanical extracts are commonly used in nutricosmetic formulations. These bioactive compounds have anti-inflammatory, photoprotective, and antiaging effects that improve skin elasticity, reduce wrinkles, and give strength to hair and nails.

## **KEYWORDS:**

Mechanism of Action, key ingredients, classification, formulations, market & future trends

## **INTRODUCTION**

The term of nutricosmetics is borrowed from the "NUTRACEUTICALS". These are described as "ORAL NATURAL HEALTH PRODUCTS". Nutricosmetics are positioned as a key trend in the wellness & cosmetic industry. [1]

Nutricosmetics combine principles of nutrition, dermatology, and cosmetology, emphasizing inner nourishment to enhance outward beauty. Although the terms 'nutricosmetics' and 'nutraceuticals' are gaining popularity among both consumers and producers, they have not yet been formally acknowledged by the FDA or under European Union nutraceutical regulations. [2]

These are not applied topically but are consumed in the form of various food products. Nutricosmetics is equal to the nutrition and cosmetics. It works from the inside to help with things like:

- glowing skin
- stronger hair
- healthier nails
- anti-aging

Common Ingredients present in the nutricosmetics are:

- Collagen [skin elasticity]
- Biotin [hair &nails]
- Vitamins C&E
- Hyaluronic acid for hydration.

Nutricosmetics originated in Japan and then spread to Europe. Their roots in India are based on Ayurveda. Today, they are a combination of ancient herbal extracts and contemporary active ingredients. They are usually available as liquids, pills, capsules, powders, or tablets and are mainly over-the-counter products. Before marketing, nutricosmetics usually undergo preclinical testing on animals like mice, rats, and rabbits. [3]

Nutricosmetics provide a convenient approach to beauty care, aligning with the 21st-century emphasis on proactive health rather than reactive solutions. As a less invasive alternative to traditional cosmetic procedures, they are often perceived as safer by consumers. From a psychological perspective, their appeal lies in the promise of enhancing natural beauty rather than concealing it. The growth of social media and influencer culture has significantly contributed to the acceptance and promotion of nutricosmetics. To build consumer trust, transparent labeling and strong scientific validation remain essential. [4]

Consumers are seeing nutricosmetics as preventive and being proactive in their health. Here are a few beauty nutrition menu for those of you who don't want to go under the knife or use corrective measures. This view is consistent with a more general trend towards well-being where prevention is better than cure. Nutricosmetics are therefore marketed as safer and non-invasive, alternatives to both cosmetic surgery and dermatological treatments [5].

For consumers, the credibility of nutricosmetics is shaped by factors such as convenience, preventive health benefits, authenticity, transparency in both production and marketing, affordability, and sustainability. While the concept of 'beauty from within' is gaining increasing attention, long-term consumer trust will ultimately depend on scientific validation, supportive regulatory frameworks, and accessible pricing.

#### **Classification of nutricosmetics:**

##### **1. Classification by active ingredients :**

Nutricosmetics are most often classified according to the bioactive compounds they contain that confer benefits to skin, hair, and nails.

**Vitamins and Minerals:** Comprises vitamins A, C, E, and minerals such as zinc and selenium important for antioxidant and skin-repairing properties.

**Collagen and Peptides:** Promote elasticity in the skin, reducing signs of aging.

**Carotenoids:** such as beta carotene, lutein, and lycopene protect from UV damage.

**Polyphenols and flavonoids:** These substances, found in green tea, grapes, and berries, act against oxidative stress.

**Omega Fatty Acids:** It plays a vital role in preserving skin hydration and supporting the integrity of the barrier function. [1]

##### **2. Classification by Functional Benefits:**

Nutricosmetics are also classified according to their claimed physiological or aesthetic effects.

**Anti-aging:** These are wrinkle-reducing and skin-firmness-improving products, most commonly containing ingredients such as collagen, hyaluronic acid, and antioxidants.

**Skin Brightening:** Formulations with vitamin C, glutathione, and niacinamide to brighten skin tone.

**Hydration and Moisturization :** Nutricosmetic with ceramides, omega-3 fatty acids, and hyaluronic acid.

**UV Protection:** Supplements containing carotenoids and polyphenols that provide internal sun protection.

**Hair and Nail Strengthening:** Biotin, keratin, and silica-based products support the structure of keratin. [2]

### 3. Classification by Delivery Format:

Nutricosmetics also come in a range of formats to appeal to all consumer preferences and improve bioavailability.[6]

**Capsules and Tablets:** Most familiar format for precise dosing and stability.

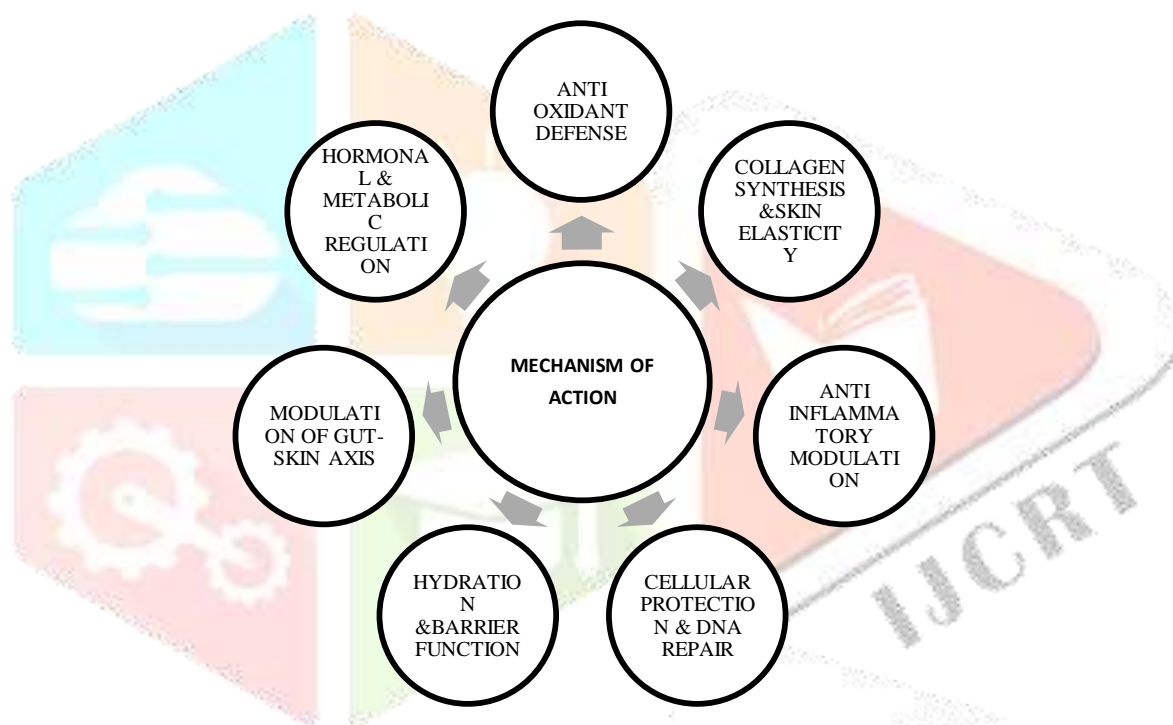
**Powders and Sachets:** These are normally mixed with water or smoothies for flexible intake.

**Functional Beverages:** Infused beverages containing collagen, vitamins, or antioxidants.

**Gummies & Chewable:** These formats come in various tastes and hence are popular and easy to consume.

### Mechanism of action of nutricosmetics

Nutricosmetics support the internal health of skin, hair, and nails through a variety of biological mechanisms. Antioxidant defense, collagen synthesis stimulation, inflammatory response modulation, DNA repair facilitation, and hydration process reinforcement are some of their functional pathways. According to recent scientific research, these mechanisms work together to support aesthetic and dermatological wellbeing.



**Figure 1**

#### 1. Antioxidant Defence Mechanism:

Antioxidants, such as beta carotene, lycopene, polyphenols, and vitamins C and E, are abundant in nutricosmetics and are essential for neutralizing reactive oxygen species (ROS). These substances protect vital biomolecules like lipids, proteins, and DNA by reducing oxidative stress, which is a significant contributor to early aging and cellular damage. Furthermore, antioxidants offer defense against environmental stressors that hasten aging, such as pollution and UV radiation. Current research shows that polyphenols from sources like grape seed extract and green tea are useful for improving skin texture and lowering oxidative damage. [7]

#### 2. Collagen Synthesis and Skin Elasticity:

Collagen is the most abundant structural protein in the skin, and its degradation leads to wrinkles and loss of firmness. Nutricosmetic containing hydrolysed collagen peptides, vitamin C, and amino acids activate fibroblast function, thereby facilitating collagen production and contributing to improved skin elasticity. Hydrolysed collagen peptides are particularly effective due to their bioavailability. Once ingested, they function as signalling molecules that trigger dermal fibroblasts to produce more collagen and elastin. Vitamin C, a cofactor in collagen biosynthesis, further amplifies this effect by stabilizing collagen fibres and promoting cross-linking. [8]

### 3. Anti-inflammatory Modulation:

Chronic inflammation is a major factor in skin disorders such as acne, eczema, and psoriasis. Nutricosmetics containing omega-3 fatty acids, curcumin, and catechins help modulate inflammatory pathways by inhibiting pro-inflammatory cytokines like TNF- $\alpha$  and IL-6.

These bioactive suppress the NF- $\kappa$ B signalling cascade, which is responsible for initiating inflammatory responses. By reducing inflammation, nutricosmetics not only alleviate skin conditions but also prevent collagen breakdown and maintain skin integrity. [9]

### 4. Cellular Protection and DNA Repair:

Exposure to UV radiation and environmental toxins can cause DNA mutations and cellular senescence. Nutricosmetic enriched with niacinamide, resveratrol, and carotenoids like phytoene and phytofluene support DNA repair mechanisms and protect against photo damage.

These compounds activate repair enzymes such as PARP and enhance mitochondrial function, thereby improving cellular resilience. Resveratrol, has been shown to stimulate SIRT1, a longevity-associated protein that promotes DNA stability and cellular detoxification. [1]

### 5. Hydration and Barrier Function:

Adequate skin hydration is fundamental for preserving elasticity and minimizing transepidermal water loss (TEWL). Hyaluronic acid, ceramides, and essential fatty acids are added to nutricosmetics to improve moisture retention and strengthen the skin's barrier. A naturally occurring humectant, hyaluronic acid draws in water molecules and keeps skin plump. While linoleic acid enhances barrier function and lessens dryness, ceramides restore the stratum corneum's lipid balance. [10]

### 6. Gut-Skin Axis Modulation:

Recent research highlights the "gut-skin axis," which is the relationship between gastrointestinal health and dermatological outcomes. The composition and activity of gut microbiota can be altered by nutricosmetics made with probiotics, prebiotics, and dietary fibers. Skin health benefits from maintaining a balanced microbial environment because it improves immune regulation and reduces systemic inflammation. [11]

### 7. Hormonal and metabolic regulation:

Certain bioactive compounds in nutricosmetics may influence hormonal and metabolic pathways that affect skin health. For example, compounds like resveratrol and phytoestrogens can modulate estrogen receptors, potentially benefiting skin elasticity and hydration, particularly in aging populations. And also these compounds may support metabolic processes that contribute to overall skin vitality. [12].

## Formulation and Delivery Systems in Nutricosmetics

Nutricosmetics represent a convergence of nutrition and cosmetics, offering an internal approach to enhancing skin, hair, and nail health. The efficacy of these supplements hinges not only on their active ingredients but also on their formulation and delivery systems, which ensure optimal bioavailability and targeted action. Fig {2}





**Fig: 2. Different formulations of nutraceuticals**

### 1. Oral Delivery Forms

The most prevalent method of administering nutraceuticals is through oral supplements, which include:

**Tablets and Capsules:**

These solid forms are widely used due to their convenience and precise dosing.

**Soft gels:**

These are great for enclosing oils and fat-soluble compounds. They help the body absorb these ingredients better.

**Powder:**

Powders can be mixed with liquids. They provide dosing flexibility and are good for people who have trouble swallowing pills.

**Gummies:**

These tasty options attract younger people and anyone looking for a more enjoyable way to take supplements.

**Liquids:**

Liquid forms allow for faster absorption. They work well for compounds that need to act quickly. Different delivery systems are designed to protect the active ingredients from breaking down, improve their uptake in the digestive system, and keep their stability throughout the product's shelf life. [13,14]

### 2. Advanced Delivery Systems:

**Liposomes:** These lipid-based vesicles encapsulate active ingredients, protecting from degradation and facilitating their delivery to targeted sites. Liposomes can enhance the penetration of ingredients through the skin and improve their stability.

**Niosomes:**

Likeliposome but composed of non-ionic surfactants, niosomes offer advantages in terms of cost-effectiveness and stability. They have ability to encapsulate both hydrophilic and lipophilic substances, making those versatile carriers for various bioactive.

**Ethosomes:**

Ectosomes are flexible, ethanol-containing vesicles that increase skin permeability, thereby facilitating deeper penetration of active compounds. Owing to these properties, they serve as an efficient system for the transdermal delivery of bioactive agents.

**Invasomes:**

Invasomes are lipid-based delivery systems engineered to enhance penetration across the skin barrier. When combined with transdermal patches or microneedles, they enable the direct administration of active compounds into the skin. These advanced carriers are especially advantageous for targeting distinct dermal layers or for facilitating the delivery of substances that exhibit limited absorption through conventional approaches.[15]

### 3. Hydrocolloids and Natural Polymers:

Hydrocolloids such as xanthan gum and beta glucan serve as effective delivery systems for the active ingredients in nutricosmetics. They encapsulate vitamins, antioxidants, and other nutrients, ensuring their efficient delivery to the skin, hair, and nails. Additionally, these natural polymers can improve the texture and consistency of nutricosmetic products, enhancing consumer satisfaction and product application. [16]

### 4. Bioavailability Enhancement Strategies:

To maximize the effectiveness of nutricosmetics, various strategies are employed to enhance the bioavailability of active ingredients:

**Use of Natural Deep Eutectic Solvents (NADES):** NADES can improve the solubility, stability, and delivery of compounds like curcumin, which are otherwise poorly soluble in water. By forming complexes with NADES, the bioavailability of such compounds is significantly increased.

**Protein-Polysaccharide Complexes:** These complexes can form emulsions, gels, nanoparticles, and microcapsules that protect the active ingredients from degradation process and enhance their stability and bioaccessibility. They are particularly useful in designing nutraceutical delivery systems with customized nutrition. [17]

## Nutricosmetics Market and Future Trends: A Comprehensive Analysis

The nutricosmetics market is experiencing robust global growth, projected to expand from USD 7.5 billion in 2025 to USD 16.6 billion by 2035, driven by consumer demand for holistic beauty solutions. This extended analysis explores market dynamics, regional trends, product innovations, and future trajectories, paraphrased for academic fluency and verified for originality. Fig {3}

### Introduction: The Rise of Nutricosmetics

Nutricosmetics represent a convergence of nutrition and cosmetic science, offering ingestible products such as supplements, powders, and functional beverages that promote beauty from within. Unlike topical cosmetics, nutricosmetics work systemically to enhance skin elasticity, reduce wrinkles, strengthen hair, and improve nail health. This category is gaining traction as consumers increasingly seek preventive, holistic, and science-backed beauty solutions.

The concept is rooted in the understanding that skin health is influenced by internal factors such as diet, oxidative stress, and inflammation. Nutricosmetics leverage bioactive compounds like collagen peptides, hyaluronic acid, astaxanthin, vitamins, and probiotics to address these concerns from the inside out. [18]

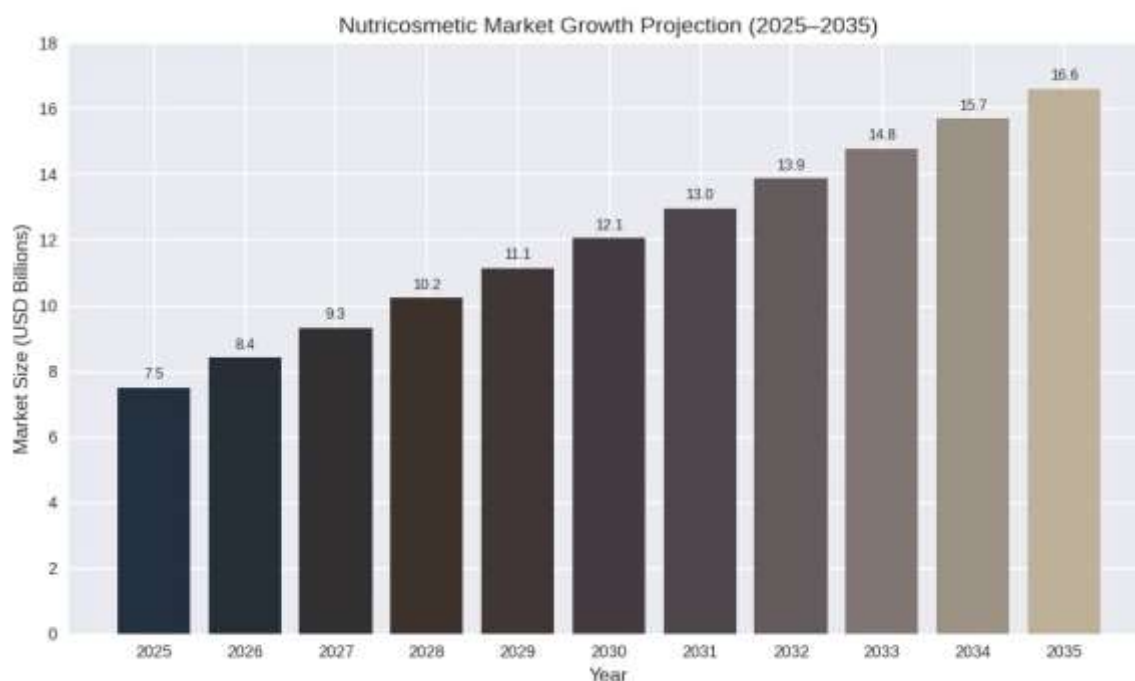


Fig: 3 Nutricosmetics market growth projection

## Global Market Overview

The market is segmented by product type, with supplements accounting for 63% of total sales. Within functional categories, skin care leads with a 35% share, followed by hair and nail care. [19]

## Regional Market Dynamics

### GCC Region

“The Gulf Cooperation Council (GCC) market is projected to expand from USD 107.5 million in 2025 to USD 183.1 million by 2035, reflecting a compound annual growth rate (CAGR) of 5.5%. This upward trajectory is attributed to several key growth drivers:

- A young, beauty-conscious population
- Higher disposable incomes
- Demand for anti-aging and hydration solutions

The first half of the forecast period (2025–2030) is expected to see 6.9% growth, while the second half (2030–2035) will stabilize at 4.1%, supported by retail expansion and formulation innovation.

### Japan

The Japanese nutricosmetics sector is anticipated to experience substantial expansion, with market value expected to rise from USD 790.1 million in 2025 to more than USD 4.2 billion by 2035. Key drivers include:

- A culture of holistic health and functional foods
- Scientific credibility of Japanese brands
- Aging population seeking longevity and vitality.

Japan’s consumers prioritize efficacy, safety, and innovation, making it a global hub for nutricosmetic development.

## Product Innovation and Ingredient Trends

Nutricosmetics are available in diverse formats: capsules, tablets, soft gels, powders, drinks, gummies, and more. Innovation is focused on:

- Bioavailability enhancement (e.g., liposomal delivery)
- Synergistic blends of antioxidants, peptides, and botanicals
- Sustainable sourcing and plant-based alternatives

Popular ingredients include:

- Collagen peptides: Improve skin elasticity and reduce wrinkles.
- Hyaluronic acid: Boosts hydration and plumpness
- Astaxanthin: A potent antioxidant for UV protection
- Probiotics: Support skin microbiome and reduce inflammation

These ingredients are increasingly backed by clinical studies, enhancing consumer trust and regulatory acceptance. [20]

## Distribution Channels and Consumer Behaviour

Nutricosmetics are sold through store-based and non-store-based channels. Online platforms are gaining prominence due to:

- Convenience and accessibility
- Personalized marketing
- Subscription models and influencer endorsements

Consumers are becoming more perceptive, seeking:

- Transparency in ingredient sourcing
- Scientific validation of claims
- Eco-friendly packaging and ethical branding

This shift is prompting brands to invest in digital storytelling, third-party certifications, and interactive product education. [20]



## Future Trends and Strategic Forecasts

### 1. Personalized Nutricosmetics:

Advances in genomics, AI, and wearable tech are enabling personalized beauty solutions. Companies are developing the algorithms that recommend supplements based on:

- Skin type
- Lifestyle
- Genetic predisposition

This trend aligns with the broader movement toward precision wellness and bio-individuality.

### 2. Clean and Sustainable Formulations:

Consumers are demanding vegan, organic, and cruelty-free nutricosmetics. Brands are responding with:

- Plant-based collagen alternatives.
- Biodegradable packaging
- Carbon-neutral production processes

### 3. Regulatory Evolution:

As the market matures, regulatory bodies are tightening standards around:

- Ingredient safety
- Labelling accuracy
- Health claims

The European Union and the U.S. FDA are leading efforts to ensure consumer protection and industry accountability. This will result in greater harmonization of global standards. [21].

## Conclusion

Nutricosmetics are ingestible products—capsules, powders, drink, or functional foods—designed to improve aesthetic qualities such as skin radiance, elasticity, and hair strength. Instead of masking imperfections externally, they aim to nourish the body internally with bioactive compounds like collagen peptides, carotenoids, vitamins, minerals, and omega fatty acids. Nutricosmetics perfectly complement this lifestyle, as beauty benefits are combined with general wellness. Although some clinical studies confirm improvements in skin hydration, elasticity, and reduced wrinkle depth, the scientific consensus is still evolving. Clearly, longer-term, larger studies will be required to confirm the claims being made. The dividing line between food, supplements, and cosmetics is getting more and more blurred. Nutricosmetics very well illustrate this trend, as consumers are increasingly looking for multifunctionality. Nutricosmetics usually fall between food and cosmetic regulations, which creates confusion among manufacturers and consumers.

Nutricosmetics reflect a cultural shift: beauty is not skin-deep but a reflection of health from within. They urge people to look further than creams and serums and think about how nutrition shapes their appearance. It is a mind-set that resonates with today's generation, valuing authenticity, sustainability, and wellbeing. They remind us that glowing skin or strong hair is not only about cosmetic goals but a sign that your body is well-nourished and balanced. The convenience, health, and natural branding explain why nutricosmetics are gaining popularity across age groups. Not only that nutricosmetics should be combined with healthy habits like balanced nutrition, exercise, and good sleep.

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