

# Edible Cosmetics: A Nutritional Approach to Enhancing Skin Health and Beauty.

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**Abstract:** The skin, as the largest organ of the body, serves as a barrier and first line of defence against environmental stressors. Traditional skincare has primarily focused on topical applications, but recent research emphasizes the importance of nutrition in maintaining skin health from within. This has led to the emerging field of edible cosmetics-nutraceuticals and functional foods formulated to enhance skin appearance and function. Edible cosmetics are rich in vitamins, minerals, antioxidants, fatty acids, and probiotics that work synergistically to support collagen synthesis, reduce inflammation, prevent oxidative stress, and maintain a healthy skin microbiome. This review outlines the biological mechanisms, key ingredients, and benefits of edible cosmetics and explores how gut-skin interactions influence dermatological outcomes. By integrating nutritional science with cosmetology, edible cosmetics represent a holistic and sustainable approach to skincare, offering solutions that work at both cellular and systemic levels. The paper also discusses the market trends and scientific evidence supporting the efficacy of such formulations in promoting healthy and youthful skin.

**Index Terms:** Edible cosmetics, Skin nutrition, Antioxidants, Gut-skin axis, Functional foods, Nutraceuticals

## INTRODUCTION:

The word cosmetic has been derived from the Greek work 'kosmotikos' which means beautifying. The concept of cosmetic arises from far back 1000 years ago. The ancient people used cosmetic for beautifying and religious purposes. In the past, natural ingredients mostly originating from plants, minerals, and animals were used in all cosmetic goods. The widespread use of synthetic and chemically altered components in cosmetics did not occur until the 20th century. Going back to earlier times, the use of natural ingredients in cosmetic formulations began to gain popularity in the 1990s and early 2000s. This trend was probably sparked by consumer demands and cosmetic manufacturers looking to stand out in the crowded market. The majority of the natural components were initially skin care actives, which caused a biological reaction in the skin that usually had the intended effect of improving the skin's structural integrity, offering protection from the sun, lowering chronic and photoaging, and a variety of other benefits.[2]

Since then, there has been a much greater effort across many industries to produce more sustainable products. Materials and products characterized as sustainable should provide benefits to the consumer without harming the environment. This movement has led many companies in the cosmetics industry on a quest to find natural ingredients to replace their synthetic counterparts in formulation chassis.[2]

## History of Traditional Medicines:

Plants have been utilized for medicinal purposes long before the beginning of written history. Ancient Chinese and Egyptian papyrus documents describe medicinal uses for plants over 5,000 years ago (3000 BCE). Indigenous cultures (e.g., African, Native American) used herbs in their healing rituals, while others (including Siddha, Unani, Ayurveda, and TCM) developed traditional medical systems that included herbal therapies [26]. In the last several years, there has been an explosion of consumption by consumers throughout the West of plant-based medicines and other botanicals. Since medicinal practices two hundred years ago were almost entirely based on plant-based medicines; it is both surprising and ironic that when more readily available synthetic drugs became widely available the medicinal use of herbs in the West entered a sharp decline. At the same time consumers in many developing nations still continued to use a plethora of plant-based medicines. Siddha & Ayurveda medicine in India, Kampo medicine in Japan, Traditional Chinese Medicine (TCM), and Unani medicine in the Middle East and South Asia, for instance, medically support a large percentage of their populations [27]

## Cosmetics:

Cosmetic is defined under section 3(a) of the Drugs and Cosmetics Act, 1940 as, any article intended to be rubbed, poured, sprinkled or sprayed on, or introduced into, or otherwise applied to, the human body or any part thereof for cleansing, beautifying, promoting attractiveness or altering the appearance, and includes any article intended for use as a component of cosmetic. [1]

## Edible cosmetics:

Edible cosmetics are made from food grade ingredients and are comparatively safer.

**IMPORTANCE OF EDIBLE COSMETICS:[29]****I. Antioxidant Protection:**

Certain dietary antioxidants, such as the genistein in soy, the resveratrol in red wine, the carotenoids (such as lutein and lycopene from tomatoes), the bioflavonoids in citrus fruits, the anthocyanins in dark berries, the catechins in green tea, and the resveratrol in red wine, have also been demonstrated to have favourable effects on the body's fitness, health, and skin.

**II. Anti-inflammatory effects:**

Studies show that ginger is a thoroughly studied anti-inflammatory food, and it can be utilized to address both inflammation and cancer (skin malignancy). Green tea has catechins, which are polyphenolic compounds that provide various health benefits. Green tea will reduce skin-induced erythema by 25% and enhance the flexibility and texture of the skin. Additionally, it enhanced the movement of circulation of blood and oxygen to the skin enhanced photoprotection. Grape seed extract is rich in polyphenols known as proanthocyanidins. Its ability to counteract free radicals and function as Antioxidants are what make them famous. Proanthocyanidins found in grape seed extract might be able to shield the skin from UV rays.

**III. Hydration:**

Taking collagen is recommended as an effective approach to combat skin aging since collagen is a protein found in human musculature, skeletal system, blood circulation, and dermis. Oral collagen peptide intake for eight weeks significantly improved collagen density in the dermis and moisture levels in the skin. In elderly women, a further 8-week period of collagen hydrolysate supplementation led to significantly improved levels of skin elasticity

**IMPACT OF NUTRITION ON SKIN HEALTH:****Nutritional Deficiencies and skin disorders:**

Vitamin and mineral deficiencies, including those in vitamins A, C, D, E, and zinc, can impair skin health and result in diseases like dermatitis, slowed wound healing, and heightened vulnerability to infections. For example, a lack of vitamin C can lead to weakened skin structure because it is essential for the synthesis of collagen.

**Antioxidants and Skin Protection:**

Antioxidants act as protectors when it comes to skin damage caused by free radicals-an unstable molecule that promotes premature aging and skin diseases. Multiple fruits and vegetables such as berries, tomatoes, and leafy greens provide good sources of antioxidants. Taking these foods into your system against oxidative stress can keep your skin youthful.[5] Plant-based foods are rich in fibre and probiotics that support bacteria in metabolic activities and SCFA production crucial for the regulation of gut health. Plant-based diets supply vitamin K, exclude any dairy sources, and help promote weight loss and improve the omega-3/omega-6 ratio toward a reduction of systemic inflammation. These foods also include bioactive compounds such as carotenoids, isoflavones, and antioxidants that contribute to skin barrier support and function. Combined, these mechanisms foster a healthy gut microbiome and, hence, less systemic inflammation and healthy skin.[6]

**Essential Fatty Acids and Skin Barrier Function:**

Fatty acids are essential for maintaining healthy cell membranes, which act as a barrier to protect the skin from external damage. They also play a crucial role in maintaining the skin's moisture balance, preventing dryness, and promoting a more supple and youthful appearance.

**Regarding skincare, three main types of fatty acids are particularly beneficial for the skin:** omega-3, omega-6, and omega-9. These fatty acids offer unique advantages and can address specific skin concerns.

Topical supplementation with essential fatty acids can profoundly affect the skin's fatty acid composition. They are adding basic fatty acids-rich different types of seed butter & vegetable oils that can reduce the inflammatory response in the skin's dermal and epidermal layers. Supplementation with omega-3 fatty acids gives protection from photodamage and photoaging.[7]

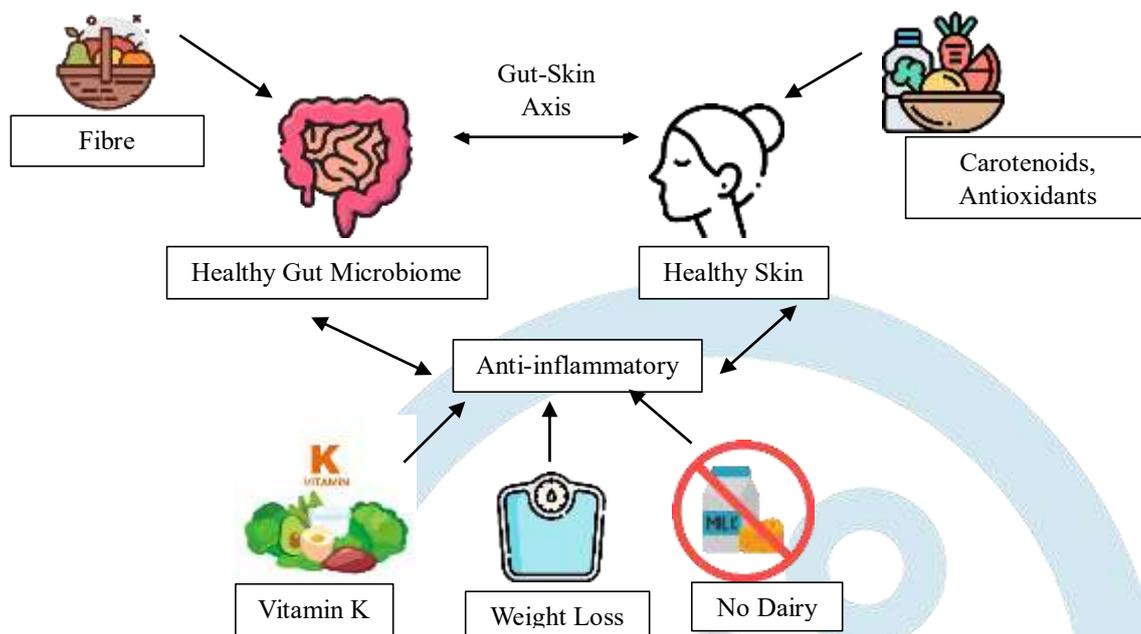
Omega-6 fatty acids are required for skin barrier function and structural integrity and reduce skin sensitivity symptoms and inflammatory skin disorders.[8]

Omega-9 fatty acids help relieve severe skin inflammation and aid in wound healing.[9]

**Gut-Skin Axis:**

Recent research has focused on the relationship between gut and skin health. The gut microbiome, a diverse community of microorganisms including bacteria, fungi, viruses and other microbes that inhabit the gut, can affect many other areas of health, including skin health. A healthy gut microbiome with balance and diversity can contribute to a healthy immune system, leading to lower incidences of inflammatory skin conditions. Probiotics, the bacteria found in fermented foods, can have an overall positive effect on gut health, and subsequently skin health. Probiotics are found in many fermented foods - yogurt, kefir, sauerkraut, and kimchi are all excellent sources of probiotics and can be helpful in creating a balance of good bacteria in the gut

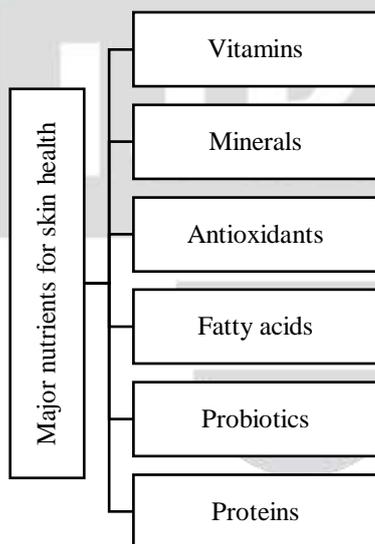
to ensure that the gut-skin axis stays healthy. Prebiotic foods (garlic, onions, carrots, bananas, and many others) are also beneficial because they help maintain healthy gut bacteria by providing nourishment and energy to the beneficial bacteria in the gut.



**Figure no: 1 Gut-Skin Axis Diagram**

**KEY INGREDIENTS AND THEIR BENEFITS:**

Nutrition plays an important role in maintaining the skin health. We know that our eating habits affects our health, unhealthy eating habits leads to various health problems such as heart disease, Gastrointestinal problem, Obesity and much more. Less do we know that our eating habits also affects our skin health. Our skin is the largest organ of our body. It tends to shed, grow and regenerate. It is first line of defence for our body and it faces daily challenges such as U.V damage, dryness, wrinkle, oily skin and injury. Just like the rest of our body our skin also requires nutrition for maintaining the balance, texture of the skin.[3] The major nutrients require for skin health are:



**Figure no: 2 Major Nutrients for skin health**

**Vitamins:**

Vitamins are essential for skin repair and prevents the damage caused to skin. It also helps in maintaining skin. The vitamins usually act on anti-oxidant mechanism and protect the skin from oxidative stress.

| Vitamins  | Mechanism | Source                                | Benefit   |
|-----------|-----------|---------------------------------------|---|
| Vitamin A |           | Sweet potato, Carrot, Spinach         | Repairs skin, prevents ageing, Promotes cell turnover.                |
| Vitamin C |           | Citrus fruits, Strawberries, Broccoli | Aids in collagen synthesis, Promotes skin elasticity.                 |
| Vitamin E |           | Nuts, Seeds, Spinach, Avocados        | Protects skin from oxidative stress, and supports overall skin health |
| Vitamin D |           | Fatty fish                            | Protects skin from UV exposure.                                       |

**Table no: 1 Vitamins****Minerals:**

Minerals, as micronutrients, are vital to skin structure and function and affect how we perceive its appearance. They come in the form of metalloproteins or ions, which serve as cofactors for enzymatic reactions, as well as incorporation into antioxidant systems, wound healing, hydration, and sebum production. Below are the main minerals and their role in skin health [13]:

| Minerals       | Functions                                      | Benefits  | Source   |
|----------------|--|---|--|
| Zinc [10]      | Anti-inflammatory, antibacterial, antioxidant. | Regulates oil production helpful in acne management, Aids in wound healing and tissue regeneration, Protects skin from UV damage.     | Pumpkin seeds, legumes, meat, whole grains.    |
| Selenium [11]  | Antioxidant defence                            | Protects skin cells from oxidative stress, may help prevent skin cancer by neutralizing free radicals.                                | Brazil nuts, sunflower seeds, fish, eggs.      |
| Copper         | Cofactor in melanin and collagen synthesis.    | Improves skin elasticity and firmness, Enhances wound healing, assists in pigmentation (reduces uneven skin tone).                    | Shellfish, nuts, seeds, dark chocolate.        |
| Magnesium [12] | Anti-inflammatory and skin barrier support.    | Soothes irritated skin and reduces inflammation, Balances hormonal acne, enhances skin hydration by improving lipid barrier function. | Leafy greens, almonds, avocado, legumes.       |
| Iron           | Oxygen transport and enzyme support.           | Prevents skin pallor and dullness, Deficiency may result in pale, tired-looking skin.   | Red meat, legumes, spinach, fortified cereals. |

**Table no: 2 Minerals****Antioxidant:** [13] [14] [15]

Antioxidants play an important role in protecting the skin from oxidative stress by protecting the skin from damage that is caused by free radicals -unstable molecules that contribute to premature aging and skin diseases.

How antioxidant work in skin?

- Neutralize Free Radicals: Prevent oxidative stress-induced damage to skin proteins, lipids, and DNA.
- Reduce Inflammation: Calm redness and irritation in sensitive or acne-prone skin.

- Boost Skin Repair: Support collagen synthesis and tissue regeneration.
- Improve Skin Tone: Fade dark spots and even out pigmentation.
- Enhance UV Protection: Complement sunscreen by reducing photodamage.

| Antioxidants                                  | Benefits  | Source   |
|---|---|--|
| Vitamin C (Ascorbic acid)                     | Brightens skin and fades pigmentation, promotes collagen production, Protects against UV-induced free radicals. | Citrus fruits, amla, strawberries                |
| Vitamin E (Tocopherol)                        | Moisturizes and protects the skin barrier, Enhances the effects of Vitamin C, Reduces UV damage and scarring.   | Nuts, seeds, plant oils,                         |
| Polyphenols (Green Tea, Grapeseed)            | Potent anti-inflammatory and anti-aging properties, inhibit enzymes that degrade collagen and elastin.          | Green tea, grapes, cocoa, berries.               |
| Carotenoids (Beta-Carotene, Lycopene, Lutein) | Protect against UV radiation, Improve skin tone and hydration.  | Carrots, tomatoes, sweet potatoes, leafy greens. |

**Table no: 3 Anti-oxidants**

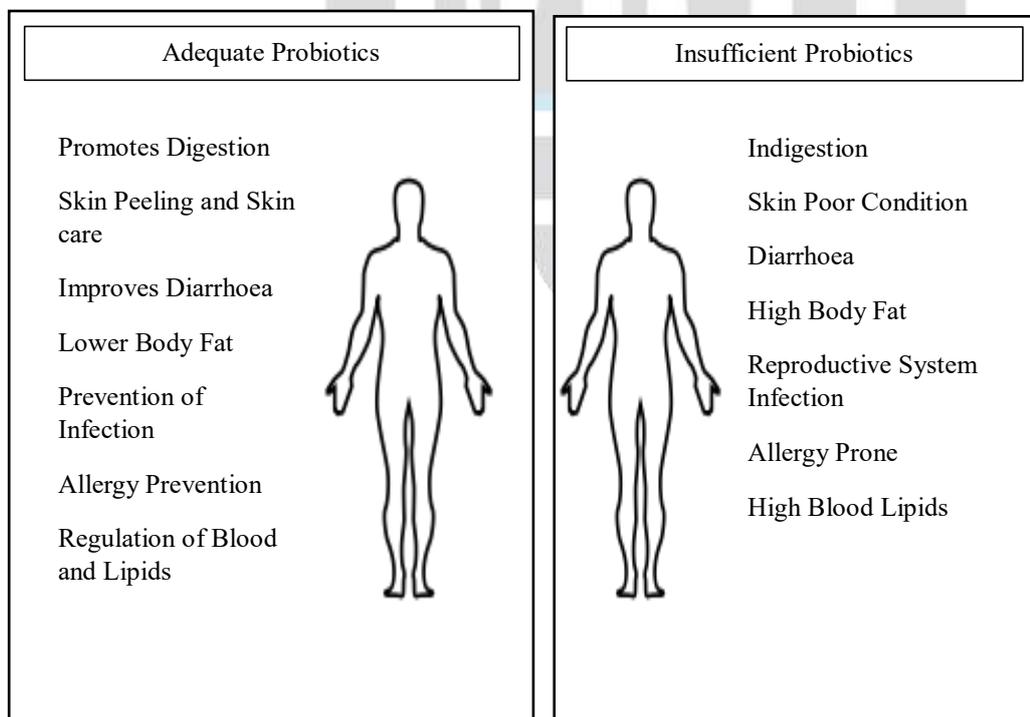
**Fatty acids: [6]**

Omega-3 Fatty Acids: Commonly found in oily fish, flaxseeds, and walnuts, omega-3 fatty acids help the skin retain moisture and regulate inflammatory skin conditions.

Omega-6 Fatty Acids: Found in oils like evening primrose and safflower oil, omega-6 fatty acids support the skin barrier and limit moisture loss

**Probiotics: [17]**

Probiotics are living microorganisms that may be applied topically or ingested to promote health by supporting the skin microbiome - the host of microscopic bacteria living on and in our skin. Recent studies demonstrate that a balanced environment for our skin microbiome is foundational for skin health, inflammatory processes, and the protection against dermatological conditions.



**Figure no: 3 Probiotics in Skincare**

**APPLICATIONS OF TRADITIONAL NUTRACEUTICAL IN CHRONIC DISEASE CONTROL.**

| <b>Nutraceutical</b>                                      | <b>Dose/ Duration</b>  | <b>Effect</b>   | <b>References</b> |
|---|------------------------|---|-------------------|
| Allenic carotenoid fucoxanthin (brown seaweeds)           | 2.4 mg /day            | Improves insulin resistance and decreases blood glucose levels through the regulation of cytokine secretions from WAT (white adipose tissues)   | 18                |
| n-3 PUFAs (polyunsaturated fatty acids)                   | -                      | Prevents several disorders affecting lungs and airways  | 19                |
| ASU (unsaponifiable residues of avocado and soybean oils) | 300mg / 3 years        | Stimulates synthesis of aggrecan and extracellular matrix component as type II collagen and by reducing the production of catabolic (MMP-3) and pro-inflammatory (IL-8 and IL-6) mediators in OA (osteoarthritis) | 20                |
| CLA (Conjugated linoleic acids)                           | 3 Months               | Significantly improves AHR (Airway hyper responsiveness) associated with a reduction in leptin/adiponectin ratio in mild asthma   | 21                |
| FPP (Fermented papaya preparation)                        | 6g/day / 6 months      | Unregulated TNF- $\alpha$ and thioredoxin (Trx) in liver cirrhosis  | 22                |
| MUFAs (monounsaturated fats)                              | -                      | Lowers CVD (cardiovascular disease) risk and MS (metabolic syndrome)  | 23                |
| 1,25(OH)2D, or calcitriol                                 | 200–600 IU/day         | Regulates the levels of p21 and p27 and increases expression of BRCA-1 and -2 tumor suppressor genes contributing in the DNA repair mechanism   | 24                |
| Fortified wheat flour                                     | 100 to 150 $\mu$ g/day | Reduces prevalence of NTDs (neural tube defect) at birth and increasing blood folate concentrations   | 25                |

**Table no: 4 Applications of Traditional Nutraceutical in Chronic disease control.****MARKET TRENDS:**

The edible cosmetics which first hit the market in the 1980s, are now on the brink of a major revolution. The global market was valued at USD 5.36 Billion in 2020. The undisputed leader in Nutricosmetics, with a 42% market share, is the Asia-Pacific region, dominated by China and Japan. They are highly innovative<sup>3</sup>, particularly with skin care products for the anti-aging and

brightening categories. Europe, with a 30% market share, shows the strongest growth rate (8.5% for 2020-2025) for products that improve appearance of skin, hair and nails. America, currently with a 24% market share, is positioned third, still needing more time to mature. By 2026, the Nutricosmetics market could potentially reach 8.8 billion euros. [28]

## CONCLUSION:

The emerging science of edible cosmetics marks a paradigm shift in skincare by recognizing that true skin health begins from within. This review highlights how nutrients, antioxidants, essential fatty acids, and probiotics—once valued only for internal health—now play a significant role in enhancing skin structure, function, and appearance. Through modulating inflammation, promoting collagen synthesis, improving skin hydration, and maintaining microbiome balance via the gut-skin axis, edible cosmetics offer a sustainable and holistic approach to dermatological well-being.

As consumer demand continues to lean toward clean, green, and health-integrated beauty solutions, edible cosmetics serve as a natural extension of both nutritional science and cosmetic innovation. The benefits extend beyond aesthetics, addressing chronic conditions such as photoaging, dryness, acne, and inflammatory skin diseases. Backed by both traditional wisdom and modern clinical research, this approach bridges ancient herbal practices with functional foods and bio actives supported by contemporary dermatology.

With increasing global market interest, especially in Asia and Europe, nutricosmetics represent not just a trend but a transformative evolution in skincare. However, to achieve full potential, more standardized clinical trials and regulatory guidelines are needed. Ultimately, the future of beauty may well lie in what we eat—making “beauty from within” not just a slogan, but a scientifically validated reality.

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