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## **THE IMPACT OF COSMETIC PRODUCT QUALITY ON SKIN CONDITION WITH DAILY USE**

**Summary.** *This study examines cosmetic products and their effects on skin condition, with a particular focus on preserving the skin microbiome, which contributes to enhanced barrier function and dermatological health. The research analyzes how the quality of cosmetic products influences skin condition in everyday use. A comprehensive methodology was employed, incorporating dermatological assessments, surveys, and objective biometric measurements. The findings revealed significant improvements in skin condition, including reduced dryness, erythema, and transepidermal water loss, as well as increased hydration and lipid balance. Additionally, the results confirmed the importance of maintaining a physiological pH level to preserve microbiome health. The data demonstrate that specialized cosmetic products can not only enhance appearance but also provide therapeutic benefits, supporting skin restoration and improving consumers' quality of life. The study underscores the need for further exploration of the interaction between cosmetics and skin physiology, as well as the development of new products capable of exerting a comprehensive influence on skin condition and health. This article will be useful for dermatologists and cosmetologists and may also serve as a resource for cosmetic manufacturers interested in producing safe and effective products.*

**Key words:** *cosmetic industry, skincare, bioactive ingredients, microbiome, pH balance, dermatological health.*

**Introduction.** The global cosmetics industry is undergoing significant transformations driven by increasing consumer awareness and a growing demand for natural formulations. Skincare has evolved beyond a superficial practice into a complex interplay of chemistry, biology, and dermatological science. Consumers now scrutinize ingredient lists with precision, avoiding preservatives, artificial colorants, and synthetic fragrances in favor of eco-friendly alternatives that support the skin microbiome. This shift has compelled manufacturers to push the boundaries of innovation, ensuring that their products not only meet aesthetic expectations but also maintain dermatological integrity and biological harmony.

At the core of these changes lies fundamental biochemical knowledge: human skin, a complex and dynamic organ, functions both as a protective shield against environmental stressors and as a thriving ecosystem for a diverse microbiome. The symbiotic relationships between skin cells and commensal microorganisms play a crucial role in modulating immunity, maintaining barrier function, and preserving overall dermatological health. Disruptions to this balance—whether through the use of aggressive cosmetic formulations or pH imbalances—can trigger inflammatory responses, weaken skin immunity, and potentially contribute to chronic dermatological conditions such as atopic dermatitis and vitiligo [2].

As demand for scientifically backed skincare solutions grows, the intersection of dermatological science, cosmetic chemistry, and consumer health continues to expand. A notable example of this trend is the incorporation of bioactive ingredients such as niacinamide, recognized for its multifaceted benefits in improving skin texture, elasticity, as well as addressing hyperpigmentation. However, while individual ingredients may offer promising dermatological benefits, overall formulations must be evaluated holistically, particularly in terms of pH compatibility and microbiome preservation [2].

The aim of this study is to explore these intricate interactions by assessing how the quality of cosmetic products influences the biochemical and

microbiological environment of the skin during everyday use. Combining scientific rigor with practical application, this research seeks to provide valuable insights into existing skincare formulations that contribute to long-term dermatological health while enhancing consumer satisfaction.

**Methods and Materials.** This study was designed to examine the impact of cosmetic product quality on skin condition with daily use, with a particular focus on individuals with visible facial imperfections who could potentially benefit from corrective skincare products. The methodological framework incorporated a multifaceted assessment strategy, combining objective dermatological evaluations with subjective consumer feedback.

A literature review identified key scientific studies relevant to the research topic. K. Andra and A. Suwalska [1], as well as A. Vargala and M. Slawska [4], conducted studies on the beneficial effects of minerals and vitamins in cosmetics on consumer satisfaction. The works of F. Alsehri [2] and C. Yanes-Becker [5] focused on evaluating the quality and safety of specific cosmetic brands and formulations. Faria-Silva and A. Asenso [3] explored the intersection of cosmetics and food ingredients, analyzing the use of food-based components in skincare products and the development of food items by cosmetic companies. Studies by Nagae M. [6] and Zhang L. [7] investigated the effects of cosmetic products on different age groups, specifically individuals aged approximately 45 and 25 years, respectively.

This study incorporated data from a representative research sample [7], where participants were divided into two distinct demographic groups: young mothers with children under two years old, representing a subgroup with increased susceptibility to hormonal fluctuations and potential skincare challenges, and a nationally representative Chinese sample ensuring broad generalizability of the findings. The study employed a sequential, crossover design, including specific cleansing, intervention, and post-intervention phases to determine the long-term effects of cosmetic product use.

Additionally, another study [1] involving 1,840 participants (95% women, mean age  $31.5 \pm 11.1$  years) was analyzed to assess the impact of cosmetics on skin condition. The primary concerns reported by participants included acne, melanoma, and rosacea. The Skindex-16 scale indicated significant improvements in symptoms, emotional distress, and functional limitations ( $p < 0.0001$ ). Skindex-16 is a 16-item questionnaire assessing dermatology-related quality of life across three domains: symptoms, emotional well-being, and functional limitations. Responses are categorized on a scale from 0 (absence of concern) to 6 (maximum severity).

**Results and Discussion.** At the initial stage, all participants underwent a standardized three-day washout period, during which they exclusively applied a placebo—a cream containing 3% glycerin and no active dermatological ingredients—to eliminate potential side effects from previous skincare routines [7]. This preliminary phase served as a biochemical reset, creating a controlled skin environment against which subsequent interventions could be evaluated. Following this preparatory phase, participants proceeded with a strictly structured 28-day treatment protocol, applying a triad of commercially available skincare products twice daily. These products were generically labeled as "facial essence," "face cream," and "eye cream" to maintain blinded conditions. Neither the participants nor the research staff were informed about the brand specifics, preventing potential biases related to product perception.

The skincare regimen included three formulations from the Olay® product line (Procter & Gamble, Australia): a tone-correcting serum (Luminous Tone Perfecting Treatment), a wrinkle-smoothing cream (Regenerist Micro-Sculpting Cream), and a targeted eye treatment (Ultimate Eye Cream). To ensure comprehensive data collection, participants completed the Farage Quality of Life (FQoL™) questionnaire at three critical time points: immediately after the washout phase (**baseline skin condition**), at the end of the 28-day treatment

phase, and after a 14-day discontinuation period, which assessed potential residual effects of product withdrawal.

Table 1

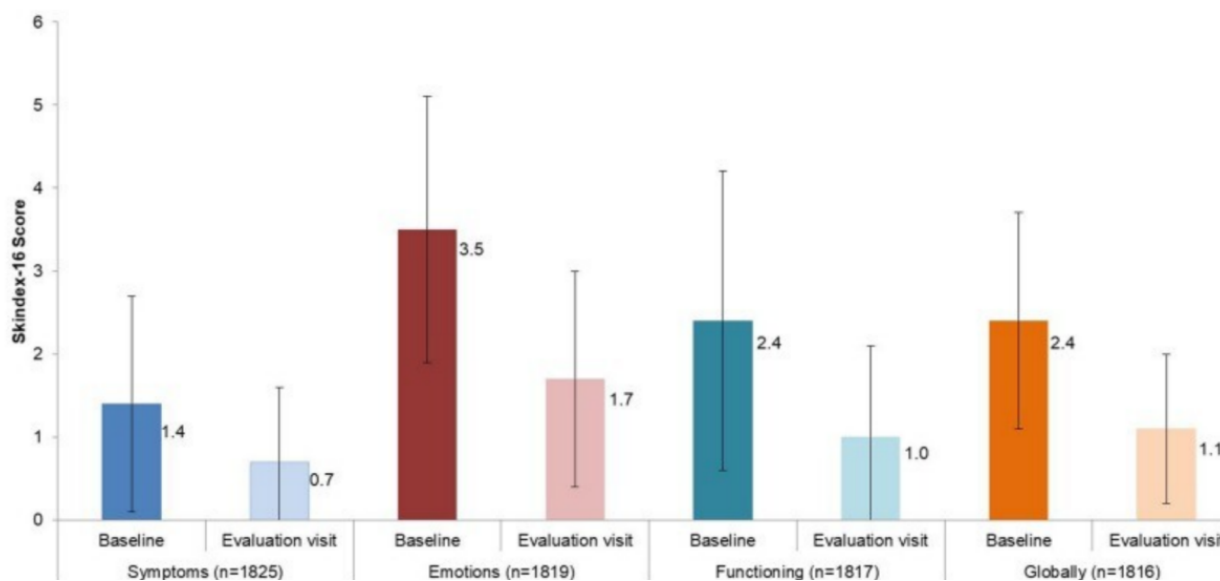
**Structure of the Farage Quality of Life (FQoL™) Instrument [7]**

Domains	Subdomains	Number of Items	Definition
Quality of life		1	Overall quality of life
Welfare	Emotion	5	Reflects a positive outlook on life
	Self-image	5	Reflects self-acceptance, self-confidence and appearance
	Self Competence	2	Reflects autonomy
Energy and Vitality	Personal Pleasure	7	Includes what consumers do for leisure and pleasure.
	Physical Condition	4	Includes physical activity, energy, and household activities of consumers.
	Routine Activities	3	Includes routine daily activities that consumers do in their lives.
Skin care module		5	Questions about empowerment, self-esteem, self-confidence, attractiveness and satisfaction with facial skin condition.

As part of the study, additional parameters were evaluated, including skin dryness, tightness, overall user satisfaction, product acceptability, and tolerability—key factors in assessing the overall effectiveness of cosmetic products. Protocol adherence was closely monitored, and 89 young mothers completed the full 28-day intervention, with 83 continuing through the 42-day follow-up period. In a nationally representative sample, 91 participants completed the initial intervention, and 90 proceeded beyond the study's conclusion. This high retention rate highlights the methodological rigor of the research, ensuring statistical reliability in assessing the relationship between cosmetic product quality and long-term dermatological outcomes.

Another study [1] involving 1,840 participants with a mean age of 31.5±11.1 years (95% women) provided compelling evidence on the impact of

cosmetic product quality on facial skin condition. Notably, among the dermatological concerns observed, acne was the most prevalent (48.9%), followed by melanoma (16.7%) and rosacea (15.3%). Skin condition was simultaneously measured using the Skindex-16 scale, a validated indicator of dermatological health and self-assessed skin quality, as illustrated in Figure 1.



**Fig. 1. Skindex-16 assessment before and after four weeks of daily facial application [1]**

A total of 81.2% of participants exhibited skin involvement affecting at least 10% of their facial surface. It is particularly noteworthy that 45.3% of participants described their skin condition as unacceptable, underscoring the profound psychological and social implications of dermatological concerns. However, nearly half of the participants (45.0% and 44.4%, respectively) reported neither skin tightness nor dryness at the beginning of the study, indicating variability in skincare needs.

At baseline, Skindex-16 scores reflected moderate impairments across key domains: symptoms ( $1.4 \pm 1.3$ ), emotional distress ( $3.5 \pm 1.6$ ), and functional limitations ( $2.4 \pm 1.8$ ), with an overall score of  $2.4 \pm 1.3$  on a scale from 0 to 6. By the end of the treatment period, all measures showed statistically significant improvement ( $p < 0.0001$ ), accompanied by a marked reduction in dryness and

tightness [1]. These improvements were mirrored in high satisfaction ratings from both participants and researchers, confirming the tested products' effectiveness and acceptability.

Importantly, the skincare regimen demonstrated excellent local tolerability, supporting its suitability for long-term use in individuals with sensitive skin or a compromised skin barrier. These findings align with a growing body of evidence highlighting the role of corrective cosmetics and camouflage makeup as adjunctive treatments for primary dermatological conditions (e.g., acne, rosacea, vitiligo, melasma) and secondary concerns such as post-inflammatory hyperpigmentation, scarring, and skin damage from treatments (e.g., oncology, therapeutic or aesthetic procedures) [7]. Beyond mere aesthetic enhancement, such interventions contribute significantly to quality of life and self-esteem, as previously reported in the literature.

While many existing products are tailored to specific skin concerns or phototypes, the tested high-performance corrective formula was specifically designed for broad application across diverse skin tones and dermatological imperfections, providing comprehensive dermatological support for men, women, and children. Furthermore, its exceptional protection against visible light—which is known to exacerbate pigmentary disorders—makes it a valuable component in preventive skincare strategies.

Despite these advantages, a demographic trend has emerged: while corrective cosmetics and camouflage makeup are theoretically suitable for all genders and age groups, survey data indicate that the vast majority of users are young women. This discrepancy likely reflects deeply ingrained sociocultural norms regarding beauty and self-perception, as well as differences in cosmetic usage habits between men and women. Nevertheless, the reliable data from this study confirm the significant positive impact of the tested corrective product on the quality of life of individuals affected by facial skin imperfections,



highlighting the need for broader dermatological recommendations that extend beyond the traditionally female-oriented consumer base.

Supporting these findings, an additional evaluation of the PRO-DERMASIL skincare line among 59 individuals with sensitive, dry, and irritation-prone skin did not reveal any pathological skin reactions—such as increased dryness, erythema, flaking, rashes, or swelling—even with prolonged use. Patch tests [2] confirmed the absence of irritant or sensitizing properties. In a subgroup analysis of 30 women with heightened skin reactivity, a structured regimen incorporating PRO-DERMASIL cleansing gel and lotion led to notable clinical improvements: within just seven days, the prevalence of severe dryness and flaking decreased by 53.3%, reaching reductions of 76.7% and 83.3% by day 14 and 86.7% by day 28. Parallel improvements were observed in erythema, which decreased by 53.4% within the first week and by 80.0% by the study’s conclusion.

Quantitative biometric assessments further confirmed the efficacy of the tested formulations. Corneometric analysis demonstrated a steady increase in hydration levels: baseline values of 25.0 units (indicating dehydrated skin) increased to 32.0 units by day 7, 38.5 units by day 14, and 40.5 units by day 28—an overall improvement of 62.0% from the study's start. Sebum levels, initially measured at 2.0 units, reflecting a lipid deficiency, increased tenfold (20.0 units) by the end of the study, indicating a significant barrier-strengthening effect. Epidermal barrier function, as measured by transepidermal water loss (TEWL), also showed substantial improvement, achieving optimal hydration levels within 14 days and maintaining stability through day 28. Additionally, initially elevated erythema index (EI) values (39.0 units) exhibited a sustained reduction of 20.5% over 28 days, aligning with clinical observations of reduced irritation. These test results support the overall conclusion regarding the positive impact of skincare products on study participants.



One of the most frequently overlooked yet crucial aspects of skincare products is their pH level. The natural pH of the skin hovers around 5.0, forming the so-called "acid mantle"—a protective barrier that prevents excessive moisture loss and inhibits the proliferation of harmful microorganisms. However, most commercially available skincare products, including cleansers, soaps, and texturizing agents, typically have an alkaline pH ranging from 7.0 to 8.0. This discrepancy arises due to the inclusion of surfactants, emulsifiers, and humectants, which function optimally at higher pH levels [5]. Unfortunately, such formulations can significantly elevate the skin's pH upon application, leading to a temporary but pronounced disruption of the acid-base balance.

Although short-term fluctuations may seem negligible, repeated or prolonged exposure to products with non-physiological pH levels can impair the skin's ability to restore its natural acidity, exacerbating dysbiosis in the skin microbiome. Recent studies [2, 5, 7] have highlighted the far-reaching consequences of this imbalance. Alkaline-induced pH shifts have been linked to an excessive proliferation of pathogenic bacteria along with a reduction in beneficial commensal microorganisms, ultimately predisposing the skin to inflammatory processes and barrier dysfunction. Moreover, since the skin struggles to restore its pH balance, prolonged exposure to high-pH products can result in chronic microbial dysregulation, further increasing susceptibility to irritation, dryness, and even chronic dermatological conditions.

Recognizing the complex interplay between pH balance and microbial diversity, researchers are now focused on developing skincare products that not only preserve the skin's natural microbiome but actively support it. Such products are described in Table 2.

Table 2

**pH Levels of Skincare Products and INCI (International Nomenclature of Cosmetic Ingredients) [5]**

<b>Product</b>	<b>pH Value</b>	<b>INCI</b>
Vitamin C + Activating Liquid	3.6	Vitamin C spheres: ascorbic acid, polyquaternium-10, Simmondsia chinensis (jojoba) seed oil Activating liquid: water, glycerin, 1,5-pentanediol, sodium lactate, Lactobacillus ferment
Resveratrol Concentrate	4.8	Aqua (water), caprylic/capric triglyceride, dimethyl isosorbide, 1,5-pentanediol, Butyrospermum parkii (shea) butter, resveratrol, glycerin, hydroxyethyl acrylate/sodium acryloyldimethyl taurate copolymer, panthenol, sodium hyaluronate, palmitoyl tripeptide-38, ethylene brassylate, hydroxypropyl cyclodextrin, citric acid, polysorbate 60, caprylyl glycol, sorbitan isostearate, 3-hexenol, propanediol, caprylhydroxamic acid
Collagen Mask + Activating Liquid	4.3	Mask: collagen, polyglyceryl-10 laurate Activating liquid: water (aqua), butylene glycol, glycerin, sodium lactate, sodium hyaluronate, Lactobacillus ferment, allantoin, saccharide isomerate, pullulan, Porphyridium cruentum extract, hydroxypropyl methylcellulose, polyglyceryl-10 laurate, 1,5-pentanediol, lactic acid, citric acid, sodium citrate, fragrance
Natural Algae Mask + Activating Liquid	4.3	Mask: algin, cellulose gum, glycerin, calcium sulfate, caprylic/capric triglyceride, citric acid, sorbitol Activating liquid: water, butylene glycol, glycerin, pentylene glycol, Lactobacillus ferment filtrate, sodium chloride, sodium hyaluronate

The development of products that maintain an optimal acidic environment enables the creation of a favorable habitat for beneficial microorganisms, thereby increasing the skin’s resistance to external stressors [3]. Beyond physiological effects, skincare also plays a crucial role in shaping consumer well-being and quality of life [6]. As the cosmetics industry transitions to cosmeceuticals—products that offer both aesthetic and therapeutic benefits—the need for comprehensive evaluation tools is becoming increasingly evident. Several methodologies have been developed to assess the impact of skincare products on

human quality of life, encompassing both objective dermatological improvements and the consumer's subjective perception [7].

For example, tools such as the Farage Quality of Life (FQoL™) allow for a multifaceted evaluation, capturing changes in overall well-being, emotional health, and self-perception in response to a skincare regimen. Studies assessing specific skincare interventions have demonstrated tangible benefits beyond surface-level skin improvements, revealing enhancements in hydration, barrier function, and elasticity that persist even after product use is discontinued [4].

These findings collectively support the effectiveness of specialized cosmetic formulations in addressing dermatological conditions, improving both the physical characteristics of the skin and psychological well-being. Given these results, dermatologists should actively recommend corrective cosmetics as part of a comprehensive treatment strategy for patients with disfiguring dermatoses, regardless of gender or age, to enhance both dermatological outcomes and overall quality of life.

**Conclusion.** Every chemical compound, pH level, and bioactive molecule exerts a profound impact on the intricate ecosystem of the skin. The presented findings clearly demonstrate that the quality of cosmetic products extends far beyond marketing claims, directly influencing the epidermal barrier functions, microbiome resilience, and physiological dynamics of tissue regeneration. The use of dermatologically optimized formulations not only mitigates the adverse effects of aggressive ingredients but also actively contributes to restoring skin homeostasis, minimizing dryness, irritation, and inflammatory reactions.

Furthermore, the psychosocial aspect of skincare confirms the inseparable link between the physiological condition of the dermis and the subjective perception of one's appearance. Corrective cosmetics have been shown to not only conceal imperfections but also actively improve dermatological health, significantly impacting self-esteem and overall quality of life. It is becoming increasingly evident that the future of the industry is closely tied to the

development of scientifically grounded, biocompatible, and microbiome-friendly formulations that do not merely enhance aesthetics but also maintain the physiological integrity of the skin at the cellular level. Therefore, future research should focus on gaining a deeper understanding of the biochemical interactions between cosmetic formulations and the skin environment, enabling the development of products that not only refine appearance but also meaningfully improve skin health.

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