INTERNATIONAL JOURNAL OF SOCIAL HEALTH
https://ijsh.ph/index.php/rp
Volume 3 Number 12 December 2024

Literature Review: The Role of Nutritional Adequacy in Preventing Skin Aging

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KEYWORDS
prevention of skin ageing, nutrition, Skin ageing

ABSTRACT
Skin ageing is a natural process experienced by every human being, influenced by environmental, genetic, and lifestyle factors. Premature skin ageing, although natural, can negatively impact a person's self-confidence. This study aims to explore the relationship between nutrient intake—such as vitamin C, vitamin E, vitamin D, omega-3 fatty acids, and other antioxidants—and skin health, focusing on their effects on slowing the skin ageing process. The study employs a qualitative method with a descriptive approach, utilizing a systematic literature review of various academic sources. The findings indicate that nutrients such as vitamin C, vitamin E, vitamin D, omega-3 fatty acids, and antioxidants have the potential to protect the skin from premature ageing. These nutrients contribute to maintaining skin elasticity, preserving moisture, and reducing damage caused by free radicals. This study highlights the importance of optimal nutrient intake in maintaining skin health and delaying the skin ageing process. It provides practical recommendations for incorporating these nutrients into daily diets to promote healthier and younger-looking skin.

DOI: 10.58860/ijsh.v3i12.272

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INTRODUCTION

Skin aging is an inevitable biological process influenced by intrinsic and extrinsic factors. It occurs due to cellular damage and the decline of critical functions, such as collagen and elastin production, which are vital for maintaining skin elasticity and firmness (Reilly & Lozano, 2021). Among the various contributors to skin aging, adequate nutrition—particularly the intake of vitamins and antioxidants—plays a key role in protecting the skin from free radical damage and ultraviolet (UV) light exposure.

Premature skin aging can be triggered by several factors, including excessive sun exposure, unhealthy diets, dehydration, and lifestyle habits such as smoking. Preventive

measures, such as consuming antioxidant-rich foods, staying hydrated, and avoiding harmful habits, are essential in mitigating these effects (Rizkyah & Karimah, 2023).

Vitamin D, widely known for its role in calcium metabolism and bone health, also protects the skin against UV-induced damage by reducing oxidative stress and inflammation (Bocheva et al., 2021). Furthermore, antioxidants like vitamins C and E combat free radicals that damage collagen and elastin, reduce inflammation, and slow down skin aging. Adequate intake of nutrients, including vitamins D, C, E, and omega-3 fatty acids, has been shown to provide significant protection against skin aging. These nutrients work synergistically to enhance collagen production, reduce oxidative stress, and promote overall skin health (Muzumdar & Ferenczi, 2021).

This article seeks to compile and analyze existing research on the relationship between nutrient intake and skin health (Giménez-Bastida et al., 2021). By exploring the influence of specific nutrients on the skin aging process, this study aims to provide evidence-based recommendations for optimal nutrition to maintain healthy skin and mitigate premature aging. The findings are based on a systematic literature review that synthesizes data from various credible sources (Paré et al., 2015).

METHOD

This research employs a qualitative method with a descriptive approach through a systematic literature review. The literature review focuses on analyzing various academic sources to gain insights into the topic. The population of this research consists of scientific articles related to skin nutrition and skin ageing available in online academic databases. The sample includes selected scientific articles that discuss the effects of nutrients such as vitamin C, vitamin E, vitamin D, antioxidants, and omega-3 fatty acids on skin ageing. Purposive sampling was used to select articles that are relevant to the research objectives. Articles were chosen based on their focus on the relationship between specific nutrients and skin ageing.

Data were collected by systematically searching academic databases and online platforms, including Google Scholar, e-journals of the National Library, and other reputable e-journals. The search was conducted using keywords such as "skin nutrition," "skin ageing," "vitamin C," "vitamin E," "vitamin D," "antioxidants," and "omega-3 fatty acids." The inclusion criteria for selecting articles were: (1) peer-reviewed studies, (2) focus on the impact of nutrients on skin health or ageing, and (3) publication within the last ten years. Articles not meeting these criteria were excluded. The data collected were grouped based on nutrient types and their effects on skin ageing. A thematic analysis was conducted to identify patterns and relationships between nutrients and their role in preventing skin ageing (Lavallée et al., 2018).

RESULT AND DISCUSSION

Table 1. Previous Research

Citation	Title	Methods	Samples/Places	Results
Dedyanto Henky Saputra (2021a)	Vitamin D's role in skin health	Literature review. Exploration of	Data from literature and previous research,	Vitamin D has anti-ageing effects by influencing genetic

Citation	Title	Methods	Samples/Places	Results
		the role of vitamin D based on findings in related scientific studies, including in vitro experiments on human keratinocyte.	including studies on keratinocytes and human hair follicles.	pathways to increase skin cell resilience, as well as inducing anti-apoptotic proteins (Bcl-2), as protection against damage from ultraviolet (UV) radiation, inducing antioxidants (metallothionein), and supporting skin regeneration and hair growth.(Saputra, 2021b)
Yasmin Adzra Nabila, Damayanti, Samsriyaningsih Handayani, Trisniartami Setyaningrum (2021a)	The Effect of Lifestyle on Skin Aging	Univariate, bivariate, and multivariate analysis using IBM SPSS. Statistic 25.	A questionnaire involving 100 patients (38 with mild ageing and 62 with severe ageing). With a sample of women under and over 36 years of age, Location: Faculty of Medicine, Airlangga University, Surabaya, Indonesia.	Significant factors for skin ageing; UV exposure: Exposure to at least 40 minutes per day had a significant association with skin ageing ($p = 0.017$). Use of sunscreen: Regular use showed a significant protective effect against skin ageing ($p = 0.002$). Use of anti-ageing creams: Regular use has a significant effect in slowing down skin ageing ($p = 0.036$). Vitamin D: Adequate intake is associated with protection against skin ageing ($p = 0.040$).(Nabila et al., 2021b)
Sri Nani Jelmila (2022)	Role of Vitamin D on Telomeres	This research uses the literature review method	The sample used is secondary data taken from literature and	The results of this study show that vitamin D plays an important role in maintaining genome stability and slowing cellular senescence through anti-inflammatory mechanism and

Vitamin C for Collagen Production and Vitamin E for Locking in Skin Moisture

Vitamin C helps the body produce collagen, which keeps the skin firm and elastic. With enough collagen, skin appears more supple, and wrinkles are smoothed. Vitamin C can inhibit the formation of melanin (a substance that causes darker skin), so skin is more even and radiant. Vitamin E keeps the skin's protective layer strong, so the moisture in the skin is well-locked in (Brookes, 2023). This makes the skin more moisturized, supple and smooth.

Vitamin D As an anti-inflammatory and antiproliferative

Vitamin D protects the skin from various ageing-inducing factors, such as ultraviolet (UV) radiation, which can cause DNA damage, inflammation, apoptosis (programmed cell death), and faster skin ageing. (Saputra, 2021a). Vitamin D acts as an anti-inflammatory and antiproliferative agent that can slow telomere shortening. The anti-inflammatory mechanism of vitamin D involves reducing proinflammatory cytokines, which in turn reduces oxidative stress. This helps maintain DNA stability and inhibits telomere erosion. Vitamin D also affects the cell cycle by inhibiting the activity of cyclin-dependent kinase complexes, thereby slowing down the cellular ageing process (Jelmila, 2022).

Antioxidants as Free Radical Neutralizers

Antioxidants are compounds that neutralize free radicals, which are reactive molecules that can damage skin cells and accelerate the ageing process (Aversa et al., 2016). Antioxidants help protect the skin from damage caused by free radicals. Free radicals can cause damage to the skin's structure, including collagen, elastin, and lipids that help maintain elasticity, moisture, and strength. Types of Antioxidants

a) Vitamin C
b) Tocopherol (Vitamin E)
c) Beta-Carotene (Pro-Vitamin A)
d) Polyphenols
e) Coenzyme Q10 (CoQ10)
f) Niacinamide (Vitamin B3)

Flavonoid Antioxidants in Inhibiting Free Radicals

According to (Bhutto et al., 2018), in preventing free radicals, flavonoids are able to stabilize ROS by eliminating oxidizing species of xenobiotic compounds. In the process of ROS inhibition, flavonoids will activate the signalling route of endogenous enzymes such as Cat, SOD, and GPx so that hydrogen peroxide (H2O2) and hydroxyl radicals (OH) are not formed (Treml & Šmejkal, 2016). Flavonoids can neutralize free radicals directly by donating H atoms. Free radicals become inactive, where (R) represents a free radical while (Fl-O) is a phenoxyl radical. The antioxidant activity of flavonoids depends on the arrangement of the functional groups of the core structure, where the arrangement and the total number of OH groups in a significant context can stimulate the mechanism of flavonoids as antioxidants. The hydroxyl arrangement of the B ring is the most dominating in regulating the capture of free radicals, while the exchange of the A and C rings has a smaller influence on the capture of superoxide anion radicals (Arifin & Ibrahim, 2018).

Omega-3 Fatty Acids UV Radiation Skin Protector

Omega-3 fatty acids can help protect skin from sun damage, which is one of the main causes of premature aging. UV radiation can damage the skin's collagen and elastin fibers, but you can counteract this with skincare products to treat wrinkles, sagging skin and hyperpigmentation (Mohiuddin, 2019). EPA and DHA can help protect skin from UV damage by reducing inflammation and supporting the skin's natural defence mechanisms.

Various interventions can be done to help prevent premature ageing of the skin this can be done by increasing the intake of foods high in antioxidants (vitamins C and E), omega 3 fatty acids, and adequate hydration by increasing fluid intake (water), which can improve skin health and reduce oxidative stress levels. In addition, using skin moisturizers can improve skin hydration, skin barrier, and skin texture, using sunscreen regularly, glasses, hats, and protective clothing can reduce the risk of excessive UV exposure. (Haluza et al., 2016). Counseling and early screening on skin health and the risk of premature skin aging are important in improving understanding, behavior change, and maintaining skin health in the elderly. It is hoped that with this activity, the community will get long-term benefits in preventing skin problems and encouraging a healthy lifestyle that cares about skin health (Fang et al., 2020).

CONCLUSION

The literature review results establish a significant relationship between nutritional adequacy and skin health in preventing premature ageing. The study's objective is to explore the role of specific nutrients and lifestyle factors in maintaining healthy skin and mitigating signs of ageing. Nutrients such as vitamins C, E, and D, along with antioxidants and omega-3 fatty acids, are critical in supporting skin health through protective mechanisms. Vitamin C facilitates collagen production, while Vitamin E strengthens the skin's protective barrier. Together, these antioxidants provide enhanced defense against sun damage, although they cannot substitute for sunscreen. These nutrients not only shield the skin from free radical damage and UV exposure but also contribute to preserving its structural integrity and functionality.

Adequate nutrition emerges as a foundational factor in maintaining skin health and delaying premature ageing, underscoring the essential role of antioxidants in promoting long-term skin vitality. These findings emphasize the necessity of a balanced diet rich in key nutrients as an integral component of effective skin care strategies. Furthermore, adopting a healthy lifestyle—including sufficient sleep, stress management, and minimizing excessive sun exposure—complements nutritional efforts in sustaining skin quality over time.

REFERENCES

Arifin, B., & Ibrahim, S. (2018). Struktur, Bioaktivitas Dan Antioksidan Flavonoid. *Jurnal Zarah*, *6*(1), 21–29. https://doi.org/10.31629/zarah.v6i1.313

Aversa, R., Petrescu, R. V., Apicella, A., & Petrescu, F. I. (2016). One can slow down the aging through antioxidants. *American Journal of Engineering and Applied Sciences*, *9*(4).

Bhutto, A. A., Kalay, Ş., Sherazi, S. T. H., & Culha, M. (2018). Quantitative structure–activity relationship between antioxidant capacity of phenolic compounds and the plasmonic properties of silver nanoparticles. *Talanta*, *189*, 174–181. https://doi.org/10.1016/j.talanta.2018.06.080

Bocheva, G., Slominski, R. M., & Slominski, A. T. (2021). The impact of vitamin D on skin aging. *International Journal of Molecular Sciences*, *22*(16), 9097.

Brookes, J. (2023). *Manners and Customs of the English Nation*. BoD–Books on Demand.

Fang, E. F., Xie, C., Schenkel, J. A., Wu, C., Long, Q., Cui, H., Aman, Y., Frank, J., Liao, J., Zou, H., Wang, N. Y., Wu, J., Liu, X., Li, T., Fang, Y., Niu, Z., Yang, G., Hong, J., Wang, Q., … Woo, J. (2020). A research agenda for ageing in China in the 21st century (2nd edition): Focusing on basic and translational research, long-term care, policy and social networks. *Ageing Research Reviews*, *64*, 101174. https://doi.org/10.1016/j.arr.2020.101174

Giménez-Bastida, J. A., Ávila-Gálvez, M. Á., Espín, J. C., & González-Sarrías, A. (2021). Evidence for health properties of pomegranate juices and extracts beyond nutrition: A critical systematic review of human studies. *Trends in Food Science & Technology*, *114*, 410–423. https://doi.org/10.1016/j.tifs.2021.06.014

Haluza, D., Simic, S., & Moshammer, H. (2016). Sun Exposure Prevalence and Associated Skin Health Habits: Results from the Austrian Population-Based UVSkinRisk Survey. *International Journal of Environmental Research and Public Health*, *13*(1), 141. https://doi.org/10.3390/ijerph13010141

Jelmila, S. N. (2022). Peranan Vitamin D terhadap Telomer. *Scientific Journal*, *1*(6), 451–461. https://doi.org/10.56260/sciena.v1i6.78

Lavallée, J. F., Gray, T. A., Dumville, J., & Cullum, N. (2018). Barriers and facilitators to preventing pressure ulcers in nursing home residents: A qualitative analysis informed by the Theoretical Domains Framework. *International Journal of Nursing Studies*, *82*, 79–89. https://doi.org/10.1016/j.ijnurstu.2017.12.015

Mohiuddin, A. K. (2019). Skin aging & modern age anti-aging strategies. *Int. J. Clin. Dermatol. Res*, *7*, 209–240.

Muzumdar, S., & Ferenczi, K. (2021). Nutrition and youthful skin. *Clinics in Dermatology*, *39*(5), 796–808. https://doi.org/10.1016/j.clindermatol.2021.05.007

Nabila, Y. A., Damayanti, D., Handayani, S., & Setyaningrum, T. (2021a). The Effect of Lifestyle on Skin Aging. *Berkala Ilmu Kesehatan Kulit Dan Kelamin*, *33*(2), 110. https://doi.org/10.20473/bikk.V33.2.2021.110-115

Nabila, Y. A., Damayanti, D., Handayani, S., & Setyaningrum, T. (2021b). The Effect of Lifestyle on Skin Aging. *Berkala Ilmu Kesehatan Kulit Dan Kelamin*, *33*(2), 110. https://doi.org/10.20473/bikk.v33.2.2021.110-115

Paré, G., Trudel, M.-C., Jaana, M., & Kitsiou, S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & Management*, *52*(2), 183–199. https://doi.org/10.1016/j.im.2014.08.008

Reilly, D. M., & Lozano, J. (2021). Skin collagen through the lifestages: Importance for skin health and beauty. *Undefined*, *8*, N-A.

Rizkyah, A., & Karimah, S. N. (2023). Literature Review : Penuaan Dini pada Kulit : Gejala , Faktor Penyebab dan Pencegahan. *JGK: Jurnal Gizi Dan Kesehatan*, *3*(2), 107–116. https://doi.org/10.36086/jgk.v3i2.2029

Saputra, D. H. (2021a). Peran Vitamin D dalam Kesehatan Kulit. *Cermin Dunia Kedokteran*, *48*(2), 89. https://doi.org/10.55175/cdk.v48i2.1302

Saputra, D. H. (2021b). Peran Vitamin D dalam Kesehatan Kulit. *Cermin Dunia Kedokteran*, *48*(2), 89. https://doi.org/10.55175/cdk.v48i2.1302

Treml, J., & Šmejkal, K. (2016). Flavonoids as Potent Scavengers of Hydroxyl Radicals. *Comprehensive Reviews in Food Science and Food Safety*, *15*(4), 720–738. https://doi.org/10.1111/1541-4337.12204