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Chapter 10: Lifestyle as medicine: Science-backed dietary, exercise, and stress-management strategies to slow aging

[1,*]Biswaranjan Paital, [2]Shivangi Mathur

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[1]*Redox Regulatory Laboratory, Department of Zoology, Odisha University of Agriculture and Technology, Bhubaneswar-751003, India.*
[2]*Maharishi University of Information Technology, Gautam Buddha Nagar-201304, Uttar Pradesh, India, Email: shivangimathur2609@gmail.com*
**Correspondence: Biswaranjan Paital, brpaital@ouat.ac.in*

Abstract

Lifestyle choices play a crucial role in modulating the aging process and promoting healthy longevity. Evidence suggests that regular physical activity, a balanced and nutrient-rich diet, adequate sleep, stress management, and avoidance of harmful habits like smoking and excessive alcohol consumption can significantly delay physiological and cognitive decline associated with aging. Practices such as caloric restriction, mindfulness, and maintaining strong social connections have been linked to improved cellular function, reduced inflammation, enhanced metabolic health, and greater resilience against age-related diseases. Adopting a holistic and proactive lifestyle not only extends healthspan but also improves the quality of life in later years. Continued research emphasizes the power of daily habits in influencing biological aging and offers strategies for sustainable, long-term health optimization.

Keywords: Caloric Restriction, Cognitive Health, Healthy Lifestyle, Preventive Health, Sleep Quality, Smoking Cessation, Social Connections, Stress Management.

10.1. Introduction

Ageing is a natural and universal process, yet how we age can vary greatly depending on the choices we make in our daily lives. Increasing scientific evidence suggests that lifestyle plays a pivotal role in determining the rate and quality of the ageing process. While ageing cannot be stopped, its progression can be significantly

slowed through healthy lifestyle practices. Key factors such as regular physical activity, a nutrient-rich diet, adequate sleep, stress reduction, and mental stimulation have been shown to support cellular health, boost immunity, reduce inflammation, and enhance physical and cognitive function. These lifestyle habits not only delay the onset of age-related diseases but also promote longevity and improve overall quality of life. In today's world, where the average lifespan is increasing, the focus is shifting toward extending the healthspan—the period of life spent in good health. Adopting a conscious, balanced lifestyle from an early stage is one of the most effective and sustainable strategies to age gracefully and live a vibrant, independent life well into old age.

10.2. Life style

Slowing aging through lifestyle changes involves adopting habits that support cellular health, reduce inflammation, and promote overall well-being. Here's a breakdown of key lifestyle practices that can help you age gracefully and healthily.

10.2.1. Nutrition: Eat for Longevity

A balanced, nutrient-dense diet can slow aging by reducing inflammation, supporting cellular repair, and promoting metabolic health. They include followings compositions. **Emphasize Plant-Based Foods:** Fruits, vegetables, legumes, nuts, and seeds are rich in antioxidants and phytochemicals. **Healthy Fats:** Include omega-3s from fish, flaxseeds, and walnuts to reduce inflammation. **Lean Proteins:** Choose fish, legumes, and moderate amounts of poultry to maintain muscle mass. **Reduce Processed Foods & Sugars:** These can accelerate aging through inflammation and oxidative stress. **Practice Caloric Restriction:** Moderate calorie reduction without malnutrition can enhance longevity pathways like sirtuin activation. **Eat Colorful Foods:** The pigments in fruits and vegetables (like anthocyanins and carotenoids) provide anti-aging benefits. So, consider a Mediterranean or Blue Zone-style diet, both linked to increased lifespan.

10.2.2. Fasting & Meal Timing

Intermittent fasting (IF) enhances cellular repair, boosts metabolism, and increases longevity. It can be of the following methods. **16:8 Method:** Fast for 16 hours, eat during an 8-hour window. **5:2 Method:** Eat normally for 5 days, reduce calories for 2 non-consecutive days.**Time-Restricted Eating:** Eat during daylight hours to align with circadian rhythms. The tips is fasting increases autophagy, the body's way of clearing out damaged cells.

10.2.3. Exercise: Move to Stay Young

Regular physical activity boosts cardiovascular health, maintains muscle mass, and enhances cellular resilience. **Aerobic Exercise:** 150–300 minutes per week of moderate-intensity (walking, cycling) or 75 minutes of vigorous activity (running). **Strength Training:** 2–3 times per week to maintain muscle mass and bone density. **Flexibility & Balance:** Yoga, Pilates, or tai chi can improve mobility and reduce fall risk. **Daily Movement:** Avoid prolonged sitting; aim for 8,000–10,000 steps daily. Exercise increases NAD+ levels, supporting mitochondrial function and sirtuin activation.

10.2.4. Sleep: Quality Over Quantity

Restorative sleep is crucial for cellular repair and cognitive function. **Aim for 7–9 Hours:** Deep, uninterrupted sleep supports hormone balance and DNA repair. **Establish a Routine:** Go to bed and wake up at the same time daily. **Create a Sleep-Friendly Environment:** Keep your bedroom cool, dark, and quiet. **Limit Screen Time:** Avoid blue light exposure 1–2 hours before bed. Good sleep boosts melatonin, which has antioxidant properties.

10.2.5. Stress Management: Mind-Body Connection

Chronic stress accelerates aging through inflammation and hormonal imbalance. **Practice Mindfulness:** Meditation, yoga, or deep breathing exercises can reduce stress. **Engage in Hobbies:** Activities like gardening, reading, or painting can calm the mind. **Social Connection:** Strong relationships promote emotional well-being and longevity. Stress reduction lowers cortisol, which can otherwise accelerate cellular aging.

10.2.6. Environmental & Lifestyle Factors

Sun Protection: UV exposure accelerates skin aging. Use sunscreen and wear protective clothing. **Avoid Toxins:** Minimize exposure to pollution, cigarette smoke, and harmful chemicals. **Stay Hydrated:** Adequate water intake supports skin health and cellular function. **Moderate Alcohol & Avoid Smoking:** Both can accelerate biological aging. Limit alcohol to occasional, moderate consumption, such as red wine, which contains resveratrol.

10.2.7. Health Monitoring & Supplements

Regular Check-Ups: Monitor blood pressure, cholesterol, glucose, and inflammatory markers. **Anti-Aging Supplements:** Consider **NAD+ boosters (NMN, NR)**, **resveratrol**, **quercetin**, **omega-3s**, and **vitamin D** if your diet is lacking.

10.3. Facials

Ageing on facial skin is conspicuous, surface topography of facial skin begins in middle age and increased upon UV exposure, hormonal changes, smoking and other lifestyle associated problems (Fisher, 1997; Moita,2007 and Hall2005).As skin ages, Stratum corneum, the outermost layer of skin containing keratinized cells loses its capacity to hold water molecules and becomes susceptible to dryness. Natural or cosmetics anti-ageing products hydrate and reinforce skin's barrier properties and protect the skin from dryness. Face has different skin texture people with xerosis may experience oily area on their face. So, different kind of topical facials/products are available in market to slow down process of ageing e. g. Cosmaceutical products, Retinoids, Aplpha-hydroxy acids and polyhydroxy acids, Antioxidants, peptides, plant extracts etc.

Facial Cosmaceutical products include creams, gels, lotion and liquids. Out of these lotions and creams are emulsions of lipid and water whereas liquids, gels or serum are aqueous products containing water dispersible or water dissolving components which change the thickness, pH and skin penetration of bioactive compounds within these preparations. Some of the facial cosmeceuticals also contain added skin penetrants like polymer encapsulation, liposomal complexes etc. to achieve maximum results in anti-ageing treatments. Moisturizing products have positive impact over face as they protect skin and help skin to retain its moisture. Facial moisturizers have wide variety of products and recommended as daily use Cosmaceutical (Kraft et al, 2005).

Continuous use of moisturizers prevents water loss from transepidermal region and make corneum stratum soft and smooth with reduced dry patches with younger looking skin. Content in these moisturizers may vary according to their make and skin type but it generally includes substances e.g. Ceramides, Cholesterol, Water binding humectants, petrolatum, glycerin and glycols, fatty acids, pyrrolidone carboxylic acid, skin barrier lipids, Sodium hyaluronate, amino acids, lactate, waxes, Natural synthetic Polymers etc. Moisturizers are generally base material for inclusion of active ingredients like antioxidants, peptides, retinoids, plant extracts, marine extracts or other anti-ageing cosmeceutical. Topical antiageing active components can be divided into many classes, like on the basis of source (botanical extracts, marine extracts), chemical

structure (alpha-hydroxy acids [AHAs], retinoids, polyhydroxy acids [PHAs], vitamins [C, E, B3, B5], peptides, and proteins), or on the basis of function (e.g., antioxidants, skin lighteners, growth factors, anti-irritants, humectants, barrier lipids, anti-inflammatories).

Several plant parts (e.g. stem, fruit, bark, seeds, and flower) and marine extracts (e.g. Extracts from brown and red algae) have been reported to play role delay of ageing on facial skin (Dover, 2016). However, without any standardization of potency and *in vivo* biological reaction against known standard compound, it is challenging to measure effect and role of a particular bioactive component within the extract.

Many facial treatments also include cell culture extracts consisting of skin growth factors (peptides) such as epidermal growth factor; fibroblast growth factor, platelet derived growth factor etc. as these growth factors are responsible for growth and maintenance of body cells. These growth factors can be used single, in combination of 2-3 peptides or mixture of many produced from cell culture. Preparations from these peptides have shown promising results of improvement in wrinkles over lower face, around the eyes along with improvement in mottled pigmentation and skin roughness in clinical studies (Sunderam et al., 2009; Atkin et al, 2010; Liu et al., 2013).

For effective anti-ageing regime topical retinoid cure is still considered as reference standard for clinical efficiency of other anti-ageing treatments. Kligman et al (1984), first reported use of retinoic acid to repair UV damage skin. After so many years retinoic acid is still used as referral point for facial rhytides. Retinoic acid and Vitamin A are collectively known as Topical retinoids and contain compounds such as retinaldehyde, retinol and other retinyl esters (Bailly et al., 1998, Darlenski, 2010, Sorg et al., 2006). Retinoic acid may have some side effects such as skin irritation to a large population, however some product have improved retinol-polymer delivery system resulting in reduced irritation due to slow epidermal penetration and increased shelf life of retinol products and thus are more popular in use (Kligman and Gans, 2000; Kafi et al., 2007; Tavakkol, 1995). Patients are suggested to use a broad spectrum sunblock (UVA and UVB blockers with SPF 30) during the day as retinoid make epidermal layer compact and thin.

Results of these topical facial products on ageing face are measured clinical grading scales, photography and instrumental methods (Rubino, 2005; Jiang, 2013; Stephens, 2016). Individual signs on face before treatment and after treatment are recorded for clinical grading assessment. These signs include Tactile and visual

roughness, Hyper pigmentation and dyschromia, diffused redness and inflammation, area of skin around eyes and mouth (Periorbital and perioral rhytides) and laxity of skin.

In addition to facial treatments one more novel approaches of needle shaping technique which uses subcutaneous micro-transplant in facial skin. The dermatological assessment established that skin laxity and tone is improved after micro-transplant, resulting in younger, fresher look of the facial skin (Sifaki et al., 2019). However, sensitivity of patient's facial skin, history of antiageing product used, and specific concerns of patient's facial ageing are first considered in choosing a selective treatment regimen to best fit individual patient skin type.

Conclusion

Slowing the ageing process is not solely dependent on medical advancements—it is deeply rooted in the everyday lifestyle choices we make. A balanced diet, regular physical activity, quality sleep, stress management, and mental engagement all contribute to healthier ageing by supporting the body's natural repair systems, reducing inflammation, and preserving physical and cognitive function. These habits not only delay the onset of age-related diseases but also enhance overall quality of life and independence in later years. Unlike pharmaceutical interventions, lifestyle-based strategies are accessible, sustainable, and beneficial across all stages of life. In conclusion, while we cannot stop time, we can influence how we age. By adopting and maintaining a healthy lifestyle, it is possible to extend not just lifespan but healthspan, allowing individuals to enjoy a longer, more active, and fulfilling life.

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