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THE IMPACT OF SUNLIGHT EXPOSURE ON THE HEALTH: DISCOVERING THE NUMEROUS BENEFITS AND HAZARDS TO THE OLDER ADULTS

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Abstract

This study examined the impact of sunlight exposure on the health, discovering the numerous benefits and hazards to the older adults. Sunlight, as a natural component of daily life, plays a fundamental role in supporting human health and well-being. In the context of carrying out this research, the following subheads were explored: concept of sunlight, the concept of health and concept of older adult among many others. The study mentioned the general impact of sunlight exposure on human health to include: vitamin D synthesis/bone health, cardiovascular benefits/mental health and circadian rhythm regulation. Furthermore, vitamin D synthesis and bone health, muscle function/fall prevention and mental health benefits were also mentioned as the benefit of sunlight exposure on the health of older adult. The hazard of sunlight exposure on the health of older adult were mentioned to include: skin damage and carcinogenesis immunosuppression and inflammation and ocular damage. Based on this, the study concluded that sunlight exposure holds both promise and peril for older adults. Moderate sunlight boosts vitamin D synthesis, crucial for bone strength and immune support. One of the recommendations made was that older adults should aim for 10–30 minutes of sunlight exposure on the hands, arms, and face 2–3 times a week, preferably before 10 a.m. or after 4 p.m. when UV rays are less intense.

Keywords: Sunlight Exposure, Health, Benefits, Hazards and Older Adults

Introduction

Sunlight, as a natural component of daily life, plays a fundamental role in supporting human health and well-being. While it is often associated with warmth and light, its influence on human physiology extends far beyond mere illumination. Sunlight exposure, particularly the ultraviolet B (UVB) rays, stimulates the synthesis of vitamin D in the skin, a process that is critical to bone development, immune function, and overall metabolic balance. Over the years, researchers have explored the complex relationship between sunlight and health, revealing both its tremendous benefits and potential risks. As urbanization increases and indoor lifestyles become more dominant, understanding the true impact of sunlight exposure has never been more crucial. A growing body of scientific evidence underscores the positive effects of moderate sunlight exposure on physical and mental health. Vitamin D, often referred to as the "sunshine vitamin," is synthesized when skin is exposed to UVB radiation. It is vital for calcium absorption, bone mineralization, and the prevention of rickets, osteoporosis, and certain autoimmune diseases (Holick, 2020). Beyond physical health, sunlight has also been shown to influence mood and

cognitive function. Exposure to natural sunlight boosts the release of serotonin, a neurotransmitter that contributes to feelings of well-being and happiness. This phenomenon explains the use of light therapy in the treatment of Seasonal Affective Disorder (SAD), a type of depression that occurs during periods of low sunlight exposure, particularly in winter months (Lam et al., 2021). Despite its benefits, excessive exposure to sunlight—especially unprotected exposure—poses significant health risks. Prolonged contact with ultraviolet (UV) rays can lead to sunburn, skin aging, eye damage, and most notably, an increased risk of skin cancers such as melanoma, basal cell carcinoma, and squamous cell carcinoma. This duality makes sunlight a "double-edged sword": while a certain amount of exposure is essential, overexposure without protective measures like sunscreen or clothing can be hazardous. This has led to a global public

health dialogue on balancing sun safety with the necessity of adequate sunlight for optimal health. Moreover, disparities in sunlight exposure due to geographical location, skin pigmentation, cultural practices, and occupational environments significantly influence health outcomes. Individuals living in high-latitude regions may experience vitamin D deficiency due to insufficient UVB radiation, especially during winter months. Likewise, people with darker skin tones have more melanin, which reduces the skin's ability to produce vitamin D efficiently. These variations demand tailored public health recommendations and further investigation into optimal sunlight exposure based on individual needs (Baggerly & Cannell, 2022).

CONCEPT OF SUNLIGHT EXPOSURE

Sunlight exposure, or being in a situation where sunlight affects you, involves both beneficial and potentially harmful effects, primarily related to ultraviolet (UV) radiation. It's crucial for vitamin D synthesis, but excessive exposure can lead to skin damage, sunburn, and increased risk of skin cancer. According to Shaffer, (2025) Sunlight has both positive and negative effects on the human body. For example, it is well known that sun exposure can cause burns to the skin and increase the risk of cancer over the long term; however, sun exposure is also required for synthesis of Vitamin D in the skin. This results in a need to find an optimal balance between healthy sun exposure and dangerous over-exposure. Sunlight, specifically UVB rays, triggers the production of vitamin D in the skin, which is essential for bone health, calcium absorption, and potentially plays a role in inhibiting certain cancers. Study by Koh, Park, Lee, Kim, Jung, Kim, Choi & Park, (2022). Exposure to sunlight increases vitamin D production. Vitamin D deficiency can lead to rickets and osteomalacia. On the contrary, overexposure to sunlight increases the risk of skin damage and cancer. Exposure to UV radiation is a known carcinogen causing skin cancers, such as malignant melanoma, squamous cell carcinoma, and basal cell carcinoma. Sunlight stimulates the production of serotonin, a neurotransmitter that can improve mood and reduce symptoms of depression. Sunlight helps boost a chemical in your brain called serotonin, and that can give you more energy and help keep you calm, positive, and focused. Doctors sometimes treat seasonal affective disorder (SAD) and other types of depression linked to low levels of serotonin with natural or artificial light. Dresden, (2020) Sunlight also supports better sleep and sets people’s circadian rhythms by regulating the levels of serotonin and melatonin. Sunlight helps regulate the body's natural sleep-wake cycle (circadian rhythm) by influencing the production of melatonin, a hormone that promotes sleep. Being in the sun generally makes people feel good, and there are many scientific reasons for this effect. One of these is that exposure to UVB rays causes human skin to produce beta-endorphins, which are hormones that reduce pain. Exposure to UV radiation can have direct immunosuppressive effects, potentially preventing autoimmune diseases.

CONCEPT OF HEALTH

Health, as defined by the World Health Organization (WHO), is a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity. This definition promoted for the first time that, in addition to physical and mental health, social welfare is an integral component of the overall health, because health is closely linked to the social environment and living and working conditions. The WHO definition links health explicitly with wellbeing, and conceptualizes health as a human right requiring physical and social resources to achieve and maintain. Health is not a static condition but a dynamic state that can fluctuate depending on various factors, including lifestyle choices, environmental conditions, and access to resources. Health is a state of well-being and the capability to function in the face of changing circumstances. Health is, therefore, a positive concept emphasizing social and personal resources as well as physical capabilities. Improving health is a shared responsibility of health care providers, public health officials, and a variety of other actors in the community who can contribute to the well-being of individuals and populations. Human health is one of the most important factors influencing economic development in any economy. Most important and immediate consequences

of environmental degradation in the world take the form of damage to human health. This refers to the state of the body, including its ability to function and resist disease. Huber (2011) proposed a new definition of health as 'the ability to adapt and to self-manage', which includes the ability of people to adapt to their situation as key to health. Health is, therefore, a positive concept emphasizing social and personal resources as well as physical capabilities. Improving health is a shared responsibility of health care providers, public health officials, and a variety of other actors in the community who can contribute to the well-being of individuals and populations.

CONCEPT OF OLDER ADULT

Older adults generally refers to individuals aged 60 years and over, though this can vary depending on context and cultural norms, with some societies considering 50 or 65 as the start of older adulthood. Most developed Western countries set the retirement age around the age of 65; this is also generally considered to mark the transition from middle to old age. Reaching this age is commonly a requirement to become eligible for senior social programs. Old age cannot be universally defined because it is context-sensitive. The United Nations, for example, considers old age to be 60 years or older (Scherbov, Sergei; Sanderson & Warren, 2019). The definition of "older adult" can vary significantly across different cultures and societies, with some focusing on chronological age and others on functional ability or societal roles. Some studies define older populations as 65 and older and others as 60 and older, but some start at ages as young as 50. A consensus is emerging that late life is not at all homogeneous and that one needs to distinguish between different ages strata, such as "young–old" and "old–old" adults.

GENERAL IMPACT OF SUNLIGHT EXPOSURE ON HUMAN HEALTH

Sunlight plays a critical role in human health, contributing both positively and negatively depending on the amount, timing, and individual characteristics such as skin type. Recent research continues to expand on these dual aspects, particularly concerning vitamin D synthesis, cardiovascular and mental health, and risks like skin cancer.

- **Vitamin D Synthesis and Bone Health:** Sunlight, particularly ultraviolet B (UVB) radiation, stimulates the production of vitamin D in the skin, which is essential for calcium absorption and bone mineralization. Vitamin D deficiency has been associated with rickets in children and osteomalacia in adults (Sassi, 2020). Furthermore, vitamin D has immunomodulatory functions that may reduce susceptibility to respiratory infections (Benskin, 2021).
- **Cardiovascular Benefits:** Emerging evidence suggests that moderate sun exposure may be linked with improved cardiovascular outcomes. Lindqvist, (2022) reported that regular, moderate sunlight exposure is associated with a lower incidence of hypertension and cardiovascular-related mortality, potentially due to mechanisms involving nitric oxide release independent of vitamin D synthesis.
- **Mental Health and Circadian Rhythm Regulation:** Sunlight is also essential for maintaining a healthy circadian rhythm and mood regulation. Exposure to natural light enhances serotonin levels, which is associated with mood elevation and cognitive function. A recent study by Seshadri, (2023) found that patients with seasonal affective disorder (SAD) showed significant improvements in mood after controlled light exposure therapy.
- **Skin Cancer Risk:** Prolonged and unprotected exposure to ultraviolet (UV) radiation remains a major risk factor for skin cancers such as basal cell carcinoma, squamous cell carcinoma, and melanoma. A comprehensive review by Kels (2023) highlights that cumulative sun exposure, especially during childhood, significantly raises melanoma risk, particularly in fair-skinned individuals.
- **Photoaging and Skin Damage:** Chronic sun exposure contributes to premature aging of the skin, known as photoaging, which is characterized by wrinkles, leathery texture, and pigmentation

changes. This is due to the degradation of collagen fibers induced by UV radiation (Kim & Cho, 2021).

BENEFIT OF SUNLIGHT EXPOSURE ON THE HEALTH OF OLDER ADULT

- **Vitamin D Synthesis and Bone Health:** Sunlight exposure offers several health benefits for older adults, primarily through its role in vitamin D synthesis, which is crucial for maintaining bone health, muscle function, and overall well-being. Additionally, sunlight exposure has been associated with improved mental health outcomes in this population. Exposure to ultraviolet B (UVB) rays from sunlight stimulates the production of vitamin D in the skin. Adequate vitamin D levels are essential for calcium absorption, which is vital for bone mineralization and preventing osteoporosis—a condition that increases fracture risk in older adults. A study conducted in Swedish nursing homes found that encouraging residents to spend 20–30 minutes outdoors daily during summer months significantly increased their serum 25-hydroxyvitamin D [25(OH)D] levels (Samefors., 2020). Similarly, research involving elderly individuals in nursing homes demonstrated that regular sunlight exposure led to significant increases in 25(OH)D levels, suggesting that sunlight can be an effective strategy to prevent vitamin D deficiency in this demographic (Başaran, 2021).
- **Muscle Function and Fall Prevention:** Vitamin D plays a critical role in muscle function. Deficiency in vitamin D has been linked to muscle weakness, which can increase the risk of falls—a major concern for older adults. By improving vitamin D status through sensible sun exposure, older adults may experience enhanced muscle strength and a reduced risk of falls (Reid, 1986).
- **Mental Health Benefits:** Sunlight exposure has also been associated with improved mental well-being in older adults. The Swedish study mentioned earlier reported that participants who spent more time outdoors during the summer months experienced better self-perceived mental health compared to those who did not (Samefors, 2020). This improvement may be attributed to increased physical activity, social interaction, or the direct effects of sunlight on mood-regulating mechanisms.

HAZARD OF SUNLIGHT EXPOSURE ON THE HEALTH OF OLDER ADULT

While sunlight is vital for vitamin D synthesis and has notable benefits, excessive or unprotected exposure to ultraviolet (UV) radiation can pose serious health risks, particularly in older adults. With age, the skin becomes thinner and more susceptible to damage, making the elderly more vulnerable to sun-related complications.

- **Skin Damage and Carcinogenesis:** Aging skin has a diminished ability to repair UV-induced DNA damage, increasing the risk of both non-melanoma and melanoma skin cancers. A study by Wang (2022) emphasizes that chronic UV exposure is a significant contributor to actinic keratosis and squamous cell carcinoma in older populations. Moreover, photoaging—manifesting as wrinkling, hyperpigmentation, and loss of elasticity—is accelerated by prolonged UV exposure (Narayanan, 2021).
- **Immunosuppression and Inflammation:** UV radiation has been shown to suppress the cutaneous immune response, making elderly individuals more susceptible to infections and delayed wound healing. According to a review by Schwarz (2022), excessive UVB exposure leads to local and systemic immunosuppression through the induction of regulatory T cells and cytokine dysregulation, increasing the risk of skin malignancies in older adults.
- **Ocular Damage:** The eyes of older adults are particularly sensitive to UV radiation. Long-term exposure is a major risk factor for cataract development and age-related macular degeneration (AMD). As reported by Yam and Kwok (2021), chronic UV exposure accelerates oxidative stress in ocular tissues, leading to protein denaturation in the lens and contributing to cataract formation.

- **Exacerbation of Pre-existing Conditions:** Certain medications commonly used by older adults, such as diuretics and antibiotics, can increase photosensitivity, making the skin more prone to sunburn and phototoxic reactions (Gonzalez. 2023). Additionally, individuals with autoimmune conditions like lupus may experience severe flare-ups when exposed to sunlight.

CONCLUSION

Sunlight exposure holds both promise and peril for older adults. Moderate sunlight boosts vitamin D synthesis, crucial for bone strength and immune support. It can enhance mood, alleviate depression, and regulate sleep through circadian rhythm alignment. However, excessive exposure increases the risk of skin aging, sunburn, and skin cancers. Aging skin is more vulnerable to UV damage, necessitating cautious exposure. Balancing sunlight intake with protective measures is vital. Time of day, duration, and skin type must be considered. Ultimately, informed sunlight management can significantly enhance health and quality of life in older age.

RECOMMENDATIONS

1. Older adults should aim for 10–30 minutes of sunlight exposure on the hands, arms, and face 2–3 times a week, preferably before 10 a.m. or after 4 p.m. when UV rays are less intense. This supports natural vitamin D synthesis, which is vital for bone health, immunity, and mood regulation.
2. When staying outside for extended periods, older adults should wear protective clothing, wide-brimmed hats, and UV-protective sunglasses. Broad-spectrum sunscreen (SPF 30+) should be applied to exposed skin to reduce the risk of skin cancer and photoaging.
3. Encourage older adults to perform monthly skin checks and consult dermatologists for any unusual moles, discoloration, or growths. Early detection of skin issues, especially skin cancers like melanoma, significantly improves outcomes.

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