Guest Editorial

Sunlight exposure is the primary cause of skin cancers: Reality or illusion?

Khalifa E Sharquie, Thamir A Kubaisi*

Department of Dermatology, College of Medicine, University of Baghdad, Center of Dermatology, Medical City Teaching Hospital, Baghdad, Iraq.
* Department of Dermatology, College of Medicine, University of Anbar; Ramadi, Anbar, Iraq.

Sunlight is essential for life as the earth has been sterilized daily by sunlight exposure since its creation. Human beings depend on daylight for its life-giving potential which was respected and worshipped by early families.[1] Ultraviolet (UV) light is a part of solar radiation and can be sub-classified into 3 components: UVA, UVB and UVC. Each variant of UV can have different effects on molecules, cells, and tissues.[2] Ancient scientific studies encouraged sunbathing and its importance in the treatment or prevention of many diseases like rickets, and lupus vulgaris. Most recently, the recovery from Covid-19 was associated with sunlight exposure.[1,3,4] Sunlight has an important effect on human health and feelings of well-being by producing beta-endorphin, and it is considered the main source of vitamin D synthesis in the epidermis for children and adults.[5] Hence, insufficient sunlight exposure, could result in hypovitaminosis D condition. On the other hand, ergosterol assists as a brilliant sunscreen by filtering and absorbing UVB light to make pre-vitamin D2.[6]

Surprisingly, researchers are exploring the efficacy of sunlight as a treatment for fine wrinkles, and the healing of wounds.[7] Furthermore, depending on Fitzpatrick skin type and local UV radiation, lack of sun exposure increases the risk of cardiac mortality, many chronic illnesses such as multiple sclerosis or type 1 diabetes mellitus, Alzheimer's disease, autism, asthma, infectious diseases, breast cancer, and colorectal carcinoma.[5] Also, indoor employees have a higher risk of death from cancer compared to outdoor workers. These hazards are related to low vitamin D, occurring due to insufficient sun exposure and could not be avoided by vitamin D replacement only.[8,9] Collectively, these evidences show that, it would be wise for individuals to ensure adequate sun light exposure of their skin to be kept healthy and immune against many other diseases.

The skin is considered as one of the largest organs of the body and is composed of epidermis, dermis, and subcutaneous layer. Keratinocytes are the main cells in the epidermis and are characterized by the formation of desmosomes (expression of cytokeratin) thus protecting the skin against external UV radiations through sun light screening and filtering by melanin pigment.[10] The UV and visible light can stimulate tanning or melanin pigment production, photoaging, wrinkling, alterations in laxity, and thinning of the skin. In

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Address for correspondence
Professor Khalifa E Sharquie, Department of Dermatology, College of Medicine, University of Baghdad, Iraqi and Arab Board of Dermatology and Venereology, Center of Dermatology and Venereology, Baghdad Teaching Hospital, Medical City, Medical Collection Office, P.O. BOX 61080, Postal code 12114, Baghdad, Iraq.
Ph: 009647901468515
Email: ksharquieprof@yahoo.com

Figure 1 Eighty years old woman with covered head since early adult life showing a deeply wrinkled face (A), and 2 basal cell carcinomas on the scalp, one on the occiput (B), and one on the frontal hairy part (C).

addition to impairment of skin functions such as thermoregulation, immune function, and wound healing.[11] Generally, various diseases such as sunburn, photodermatitis, lichenoid dermatosis, lichen planus actinicus, solar keratosis, lupus erythematosus, dermatomyositis, Dariers disease and disseminated superficial actinic porokeratosis are directly related to increased UV exposure, especially in summer where the UV index reaches its highest levels. On the other hand, studies in the past decade suggested a hypothesis for the indirect association between sun radiation and some keratinocytes damages that may initiate solar keratosis, dyskeratosis, BCC, and SCC but these are still not well documented and there is a lot of controversy.[12,13] The following eight issues, entirely, can afford strong possible explanations for the innocent role of sunlight exposure as it is not the direct primary reason behind the development of these skin cancers:

1- Ageing and wrinkling due to long exposure to the sun are cosmetically unacceptable by many people but appear as a defensive mechanism against cutaneous cancers, such as BCC and actinic keratosis which are reported to be less frequently observed in wrinkled faces. So, researchers should be focusing on another initiating factor for skin tumors.[14]

2- The physiological sun protection is provided by the presence of melanin pigment, as well as the ergosterol absorbing UVB. As both act as filters and preventing sunlight from reaching the basal cell layer.[6]

3- Albinism is a genetic disease that has no melanin protection, but patients are not significantly much more susceptible to skin carcinogenesis than normal individuals.[15] While xeroderma pigmentosa is an inherited problem, characterized by freckling, dyspigmentation, and scar involving the sun-exposed part and are more prone to develop benign and malignant skin tumors.[16,17]

4- Individuals with chronic generalized vitiligo have been reported to have a lower tendency than general people to develop cutaneous malignancies. Vitiligo skin has over-expression of P53 marker resulting in protection toward cutaneous tumors.[16,18,19]

5- Patients with BCC always have a very nice smooth face, with no wrinkling, and no solar keratosis. Interestingly and unexpectedly, many cases of BCC were recorded in the covered parts such as the scalp, axilla, breast, buttock, perineal, and genital regions.[14,20] Herein, the role of sun radiation is not very important and can be ignored **(Figure 1)**.

6- People with solar keratosis rarely change into a SCC but commonly, the other causes

of SCC are chronic burn scars, sinuses, and lichen planus rather than sunlight. The common site of SCC is the mouth, palms, and soles. Although SCC could be initially suspected to start by solar keratosis of the lip, surprisingly, those individuals have no solar keratosis anywhere in the face. For this reason, it is suggested that SCC might either develop de novo or there might be other factors responsible for triggering malignant transformation. In addition, SCC is a common tumor of the gastrointestinal tract where there is no sunlight exposure. So, we can conclude that sunlight might not be an important triggering factor responsible for SCC or it might need other additional cofactors.[21-23]

7- Malignant melanoma occurs on the hidden parts of the body, except in some cases involving the acral parts of the body like hands, feet, and face This is called acral lentiginous malignant melanoma, despite there being no role of sunlight in causing this aggressive malignant tumor.[24,25]

8- Some cutaneous lymphocytes in cases of mycosis fungoides change to a tumor, which is not influenced by sunlight but UV radiation is frequently considered as the only therapy with curative intent.[26]

In summary, human beings depend on sunlight for natural life, to make us feel good and healthy, and for supplying vitamin D. Sunlight should not be considered as the main direct cause of skin cancers in patients with sunlight exposure. The time has come to re-evaluate the harmful effects or association of sunlight exposure with cutaneous malignancy. However, continued research efforts should be carried out in order to reach a better understanding of the other reasons and mechanism involved in the initiation and progression of skin tumors.

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References

1. Holick MF. Biological effects of sunlight, ultraviolet radiation, visible light, infrared radiation and vitamin D for health. *Anticancer Res*. 2016;**36(3)**:1345-56.
2. Tatalovich Z, Wilson JP, Mack T, Yan Y, Cockburn M. The objective assessment of lifetime cumulative ultraviolet exposure for determining melanoma risk. *J Photochem Photobiol B*. 2006; **85(3)**:198-204.
3. Wierzbicka J, Piotrowska A, Żmijewski M. The renaissance of vitamin D. *Acta Biochimica Polonica*. 2014;**61(4)**:679-86.
4. Asyary A, Veruswati M. Sunlight exposure increased Covid-19 recovery rates: A study in the central pandemic area of Indonesia. *Sci Total Environ*. 2020;**729**:139016.
5. Razzaque MS. Sunlight exposure: Do health benefits outweigh harm? *J Steroid Biochem Mol Biol*. 2018;**175**:44-8.
6. Holick M. A millenium perspective Vitamin D. *J Cell Biochem*. 2003;**88(2)**:296-307.
7. Wunsch A, Matuschka K. A controlled trial to determine the efficacy of red and near-infrared light treatment in patient satisfaction, reduction of fine lines, wrinkles, skin roughness, and intradermal collagen density increase. *Photomed Laser Surg*. 2014;**32(2)**:93-100.
8. Alfredsson L, Armstrong BK, Butterfield DA, Chowdhury R, de Gruijl FR, Feelisch M, *et al*. Insufficient sun exposure has become a real public health problem. *Int J Environ Res Pub Health*. 2020;**17(14)**:5014.
9. Garland C, Shekelle RB, Barrett-Connor E, Criqui MH, Rossof AH, Paul O. Dietary vitamin D and calcium and risk of colorectal cancer: a 19-year prospective study in men. *The Lancet*. 1985; **325(8424)**:307-9.
10. Fuchs E. Scratching the surface of skin development. *Nature*. 2007;**445(7130)**:834-42.

11. Zargaran D, Zoller F, Zargaran A, Weyrich T, Mosahebi A. Facial skin ageing: Key concepts and overview of processes. *Int J Cosmet Sci*. 2022;**44(4)**:414-20.
12. Boldeman C, Beitner H, Jansson B, Nilsson B, Ullén H. Sunbed use in relation to phenotype, erythema, sunscreen use and skin diseases. A questionnaire survey among Swedish adolescents. *Br J Dermatol*. 1996; **135(5)**:712-6.
13. Saeed MY, Dhahir AM, Salih NA. The Frequency of Some Deramatoses Related to Increase Solar Radiation Exposure in Sulaimania City. *Iraqi Postgrad Med J*. 2011;**10(1)**:110-5.
14. Sharquie KE, Al-Rawi JR, Al-Rawi AS. Association between facial skin tumors and wrinkling. *Iraqi J Comm Med*. 2009;**22(3)**:147-51.
15. Lookingbill DP, Lookingbill GL, Leppard B. Actinic damage and skin cancer in albinos in northern Tanzania: findings in 164 patients enrolled in an outreach skin care program. *J Am Acad Dermatol*. 1995;**32(4)**:653-8.
16. Sharquie KE, Noaimi AA, Bandar AR, Mohsin SY. Vitiligo: Skin Malignancies and Tumor Suppressive Marker P53. *J Pigment Disord*. 2014;**1(1)**1-4. doi:10.1472/jpd.1000104
17. Sharquie KE, Jabbar RI. Childhood and adult-onset xeroderma pigmentosum: clinical evaluation with striking new findings. *Iranian J Dermatol*. 2022;**25(1)**:1-8.
18. Schallreuter KU, Tobin DJ, Panske A. Decreased photodamage and low incidence of non-melanoma skin cancer in 136 sun-exposed caucasian patients with vitiligo. *Dermatology*. 2002;**204(3)**:194-201.
19. Sharquie KE, Noaimi AA, Murtada SJ. Frequency of benign and malignant tumors in localized vitiligo in comparison to generalized and universal vitiligo. *J Cosmet Dermatol Sci Appl*. 2016;**6(4)**:133-9.
20. Sharquie KE, Abdulwahhab WS. Pigmented basal cell carcinoma develops De nova without pre-existing solar keratosis in skin type III and IV. *J Pak Assoc Dermatol*. 2023;**33(3)**:832-40.
21. Sharquie KE, Jabbar RI. The Frequency of Squamous Cell Carcinoma Among Patients with Long Standing Burn Scars. *J Turk Acad Dermatol*. 2021;**15(3)**:65-69.
22. Sharquie KE, Abdulwahhab WS, Al Abadie M. Clinical Evaluation of 80 Patients with Solar Keratosis Vs. 43 Patients with Squamous Cell Carcinoma of Lower Lips: Basal Cell Carcinoma is a Commonly Associated Disease with no Causal Relation. *Int J Clin Exp Dermatol*. 2023;**8(2)**:24-38.
23. Sharquie K, Kubaisi T. The frequency of different types of squamous cell carcinoma according to their triggering factors in patients with dark complexion skin. *J Pak Assoc Dermatol*. 2023;**33(4)**:1535-41.
24. Arisi M, Zane C, Caravello S, Rovati C, Zanca A, Venturini M, Calzavara-Pinton P. Sun exposure and melanoma, certainties and weaknesses of the present knowledge. *Front Med (Lausanne)*. 2018;**5**:235.
25. Sharquie KE, Al-Meshhadani SA, Al-Nuaimy AA. Acral lentiginous melanoma versus lentigo maligna melanoma among Iraqi patients. *Saudi Med J*. 2007;**28(1)**:105-7.
26. Sharquie KE, Kubaisi TA. Mycosis fungoides: Frightening up-surging cases as a new challenge for dermatologists and as a witness of the crime of frequent wars. *J Pak Assoc Dermatol*. 2023;**33(4)**:1225-27.