Ozga-Stachurska Alicja, Wójcik-Grudzień Justyna, Pawłowska Paulina, Rozenbajgier Martyna. Do sunscreens have more positive or negative effects? Study review. Journal of Education, Health and Sport. 2022;12(9):685-691. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2022.12.09.081
https://apcz.umk.pl/JEHS/article/view/39753
https://zenodo.org/record/7066800

The journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 21, 2021. No. 32343. Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical Culture Sciences (Field of Medical sciences and health sciences); Health Sciences (Field of Medical Sciences and Health Sciences). Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 21 grudnia 2021 r. Lp. 32343. Posiada Unikatowy Identyfikator Czasopisma: 201159. Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

Received: 21.08.2022. Revised: 02.09.2022. Accepted: 10.09.2022.

Do sunscreens have more positive or negative effects? Study review

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Abstract

Introduction: UV radiation is related to skin cancers, skin photoaging and sunburn. It can be harmful for human skin, so it is crucial to have a protection against sun rays. Substances protecting people from sun are sunscreens, that block and absorb UV radiation. The first sunscreen was discovered in 1928 and, since then, there have been many concerns about its safety, efectiveness and impant on the environment. Types of accessible sunscreens are physical sunscreens, chemical sunscreens and a combination. This study review is performed to assess possible risks of using sunscreens and evaluate if there are more positive or negative effects of their action.

The aim of the study: To evaluate positive and negative effects of sunscreens action.

Materials and methods: We searched Pubmed and ResearchGate in order to find relevant studies about sunscreens and their impact on human skin, human health and environment.

Results: There seem to be some adverse effects of sunblockers for the environment, such as destroying coral reefs, bioaccumulating in fish tissue and water sources. In some studies there was mentioned a negative impact of sunscreens on hormonal systems and pregnancy, as well as on human skin. On the other hand, many studies display that sunblockers inhibit the carcinogenic effect of sun rays, preventing people from developing skin cancers.

Conclusions: Althought sunscreens can have some negative effects, studies showed that there are more positive effects of their action. They can be harmful for the environment, but at the same time they can be a protection. Sunscreens protect skin from developing skin cancer and also delay skin aging. However, the protection against sun is complex.

Key words: skin cancer; sunscreens; protection; environment; sunblockers

Introduction: Although light is crucial to humans' life, it can also be dangerous. In literature, UV radiation is related to about 80% of skin cancers, photoaging of the skin and, of course, sunburn. Sunscreens are substances that block and reflect sun's rays (ultraviolet radiation), preventing them from penetrating the skin. The first sunscreen was developed in 1928 and since then there are many questions about the safety of sunblockers and how do they influence on the environment. Types of accessible sunscreens are physical sunscreens, chemical sunscreens and a combination of them both. Chemical sunscreens contain chemical compounds, such as octocrylene, avobenzone, and oxybenzone. These substances have implications to be the most allergenic. Physical sunscreens are composed of mineral compounds, such as titanium and zinc oxide. They are classified as natural ingredients.

Most common safety issues regarding the usage of sunscreens include some skin irritations or contact dermatitis; sunscreens also can be comedogenic, causing acne. Of course chemical compounds such as octocrylene or oxybenzone may induce allergic reactions[1].

Also, there were and still are concerns about the influence of chemical compounds contained in sunblockers on fertility and pregnancy. A study[2] showed decreased birthweight and gestational age in neonates if the mother was exposed to oxybenzone during pregnancy.

And what about the influence of sunscreens on the environment? Chemical compounds included within sunscreens are slightly resistive to degradation and can stay detectable in water despite its processing[3]. They can also affect coral reefs[4] and can be associated with their

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[1] Rodríguez E, Valbuena MC, Rey M, et al. Causal agents of photoallergic contact dermatitis diagnosed in the national institute of dermatology of Colombia. Photodermatol Photoimmunol Photomed 2006;22:189–92.

[2] Ghazipura M, McGowan R, Arslan A, et al. Exposure to benzophenone-3 and reproductive toxicity: a systematic review of human and animal studies. Reprod Toxicol 2017;73:175–83.

[3] Ramos S, Homem V, Alves A, et al. A review of organic UV-filters in wastewater treatment plants. Environ Int 2016;86:24–44.

bleaching (especially oxybenzone). What is more, they can also accumulate in the environment, as they were found in the fish tissues[5].

On the other hand, there are many studies proving that sunscreens are essential to prevent skin cancer development, delay photoaging and prevent the development of wrinkles. In the case of prevention, studies mean mostly squamous cel carcinoma; there are no further evidence of preventing against basal cell carcinoma (maybe due to its complex and chronic etiology).

However, protection against sun rays is complex and includes not only using sunscreens, but also hats, wearing thick covering clothing, sunglasses and finding shade to not to stay in the sun.

Purpose: To evaluate the correlation between sunscreens and their positive effects on human skin, such as diminished prevalence of skin cancer.

Material and methods: We did a research using Pubmed and Springer; then we made review and meta-analysis of some interesting studies. We focused on studies describing the effects of suncreens' usage.

Description of the state of knowledge:

In some studies, sunblockers had a negative impact on the birthweight and gestational age of neonates, thus their safety for pregnant women is still under concern. They also affected coral reefs, destroying them and causing them to bleach, water animals and sources of water in a sense of bioaccumulating. However, there are studies displaying their positve effect on human skin, despite being harmful for the environment.

Studies performed in the 1980s and 1990s displayed that sunscreens play a great role in protecting against damage of the cells, related to the carcinoma development in animal

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[4] Downs CA, Kramarsky-Winter E, Segal R, et al. Toxicopathological effects of the sunscreen UV filter, oxybenzone (Benzophenone-3), on coral planulae and cultured primary cells and its environmental contamination in Hawaii and the U.S. Virgin Islands. Arch Environ Contam Toxicol 2016;70:265–88.

[5] Schneider SL, Lim HW. Review of environmental effects of oxybenzone and other sunscreen active ingredients. J Am Acad Dermatol 2019;80:266–71.

models[6]. Experiments shown that sunscreens provided protection against the sun, however the protection depended on the concentration of sunscreen used. All in all, it showed the effectiveness of sunblockers.

Another study[7] showed that sunblockers, if used regularly, delay sking aging. Other, smaller experiment[8] displayed that sunscreens diminish the UV radiation effect on skin such as causing wrinkles and skin lesions or pigmentary changes, preventing skin.

In a big study from Australia the development rate of actinic keratoses in people using sunscreen on a daily basis, that may lead to squamous cel carcinoma, was slightly reduced in comparison with a control group, that used sunblocker for only 1 season[9].

What is more, there was a study among recipents of organ transplants. It also showed that the usage of a high sunscreen factor prevented skin from the development of squamous cel carcinomas and actinic keratoses[10]. However, in another study[11], the basal cel carcinomas occurence was not minimized; it could be because of the chronic etiology of these carcinomas.

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[6] Sambuco CP, Forbes PD, Davies RE, Urbach F. An animal model to determine sunscreen protectiveness against both vascular injury and epidermal cell damage. J Am Acad Dermatol. 1984 May;10(5 Pt 1):737-43. doi: 10.1016/s0190-9622(84)70088-0. PMID: 6725670.

[7] Hughes MC, Williams GM, Baker P, Green AC. Sunscreen and prevention of skin aging: a randomized trial. Ann Intern Med. 2013 Jun 4;158(11):781-90. doi: 10.7326/0003-4819-158-11-201306040-00002. PMID: 23732711.

[8] Iannacone MR, Hughes MCB, Green AC. Effects of sunscreen on skin cancer and photoaging. Photodermatol Photoimmunol Photomed 2014;30:55–61.

[9] Thompson SC, Jolley D, Marks R. Reduction of solar keratoses by regular sunscreen use. N Engl J Med 1993;329:1147–51.

[10] Ulrich C, Jürgensen JS, Degen A, et al. Prevention of non-melanoma skin cancer in organ transplant patients by regular use of a sunscreen: a 24 months, prospective, case-control study. Br J Dermatol 2009;161(Suppl 3):78–84.

[11] van der Pols JC, Williams GM, Pandeya N, Logan V, Green AC. Prolonged prevention of squamous cell carcinoma of the skin by regular sunscreen use. Cancer Epidemiol Biomarkers Prev. 2006 Dec;15(12):2546-8. doi: 10.1158/1055-9965.EPI-06-0352. Epub 2006 Nov 28. PMID: 17132769.

Accordingly to a study[12], dermatoheliosis can be reduced if the UV radiation is reduced (for instance by sunscreens) as well, however there are differences between the effects of UVA and UVB radiation on skin.

Summary:

Althought sunscreens can have some negative effects, studies showed that there are more positive effects of their action. They can be harmful for the environment and cause some damage to water or coral reefs, but at the same time they can protect humans.

Ultraviolet radiation is known to be very harmful for human skin – it is correlated with skin irritations, wrinkles and skin cancers. On the basis of our analyzes of studies, sunscreens used on a regular daily basis protect skin to a great extent from developing skin cancer. The usage of sunblockers also delays and reduces sking aging. They can help to maintain clear, healthy skin with smaller amount of wrinkles for a long time. However, we should acknowledge that protection against sun rays is very complex. It includes not only using sunscreens, but also wearing hats and thick clothing of dark colours, sunglasses for eyes protection and finding shade during sun hours.

All in all, our health does not only depend on a single thing, like using sunscreens, but many compounds are contributing to staying healthy.

References:

1. Rodríguez E, Valbuena MC, Rey M, et al. Causal agents of photoallergic contact dermatitis diagnosed in the national institute of dermatology of Colombia. Photodermatol Photoimmunol Photomed 2006;22:189–92.
2. Ghazipura M, McGowan R, Arslan A, et al. Exposure to benzophenone-3 and reproductive toxicity: a systematic review of human and animal studies. Reprod Toxicol 2017;73:175–83.
3. Ramos S, Homem V, Alves A, et al. A review of organic UV-filters in wastewater treatment plants. Environ Int 2016;86:24–44.

[12] Boyd AS, Naylor M, Cameron GS, Pearse AD, Gaskell SA, Neldner KH. The effects of chronic sunscreen use on the histologic changes of dermatoheliosis. J Am Acad Dermatol. 1995 Dec;33(6):941-6. doi: 10.1016/0190-9622(95)90284-8. PMID: 7490363.

4. Downs CA, Kramarsky-Winter E, Segal R, et al. Toxicopathological effects of the sunscreen UV filter, oxybenzone (Benzophenone-3), on coral planulae and cultured primary cells and its environmental contamination in Hawaii and the U.S. Virgin Islands. Arch Environ Contam Toxicol 2016;70:265–88.

5. Schneider SL, Lim HW. Review of environmental effects of oxybenzone and other sunscreen active ingredients. J Am Acad Dermatol 2019;80:266–71.

6. Sambuco CP, Forbes PD, Davies RE, Urbach F. An animal model to determine sunscreen protectiveness against both vascular injury and epidermal cell damage. J Am Acad Dermatol. 1984 May;10(5 Pt 1):737-43. doi: 10.1016/s0190-9622(84)70088-0. PMID: 6725670.

7. Hughes MC, Williams GM, Baker P, Green AC. Sunscreen and prevention of skin aging: a randomized trial. Ann Intern Med. 2013 Jun 4;158(11):781-90. doi: 10.7326/0003-4819-158-11-201306040-00002. PMID: 23732711.

8. Iannacone MR, Hughes MCB, Green AC. Effects of sunscreen on skin cancer and photoaging. Photodermatol Photoimmunol Photomed 2014;30:55–61.

9. Thompson SC, Jolley D, Marks R. Reduction of solar keratoses by regular sunscreen use. N Engl J Med 1993;329:1147–51.

10. Ulrich C, Jürgensen JS, Degen A, et al. Prevention of non-melanoma skin cancer in organ transplant patients by regular use of a sunscreen: a 24 months, prospective, case-control study. Br J Dermatol 2009;161(Suppl 3):78–84.

11. van der Pols JC, Williams GM, Pandeya N, Logan V, Green AC. Prolonged prevention of squamous cell carcinoma of the skin by regular sunscreen use. Cancer Epidemiol Biomarkers Prev. 2006 Dec;15(12):2546-8. doi: 10.1158/1055-9965.EPI-06-0352. Epub 2006 Nov 28. PMID: 17132769.

12. Boyd AS, Naylor M, Cameron GS, Pearse AD, Gaskell SA, Neldner KH. The effects of chronic sunscreen use on the histologic changes of dermatoheliosis. J Am Acad Dermatol. 1995 Dec;33(6):941-6. doi: 10.1016/0190-9622(95)90284-8. PMID: 7490363.