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[Intervention Review]

Sun protection for preventing basal cell and squamous cell skin cancers

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ABSTRACT

Background

'Keratinocyte cancer' is now the preferred term for the most commonly identified skin cancers basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC), which were previously commonly categorised as non-melanoma skin cancers (NMSC). Keratinocyte cancer (KC) represents about 95% of malignant skin tumours. Lifestyle changes have led to increased exposure to the sun, which has, in turn, led to a significant increase of new cases of KC, with a worldwide annual incidence of between 3% and 8%. The successful use of preventive measures could mean a significant reduction in the resources used by health systems, compared with the high cost of the treatment of these conditions. At present, there is no information about the quality of the evidence for the use of these sun protection strategies with an assessment of their benefits and risks.

Objectives

To assess the effects of sun protection strategies (i.e. sunscreen and barrier methods) for preventing keratinocyte cancer (that is, basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC) of the skin) in the general population.

Search methods

We searched the following databases up to May 2016: the Cochrane Skin Group Specialised Register, CENTRAL, MEDLINE, Embase, and LILACS. We also searched five trial registries and the bibliographies of included studies for further references to relevant trials.

Selection criteria

We included randomised controlled clinical trials (RCTs) of preventive strategies for keratinocyte cancer, such as physical barriers and sunscreens, in the general population (children and adults), which may provide information about benefits and adverse events related to the use of solar protection measures. We did not include trials focused on educational strategies to prevent KC or preventive strategies in high-risk groups. Our prespecified primary outcomes were BCC or cSCC confirmed clinically or by histopathology at any follow-up and adverse events.

Data collection and analysis

Two review authors independently selected studies for eligibility using Early Review Organizing Software (EROS). Similarly, two review authors independently used predesigned data collection forms to extract information from the original study reports about the participants, methods of randomisation, blinding, comparisons of interest, number of participants originally randomised by arm, follow-

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up losses, and outcomes, and they assessed the risk of bias. We resolved any disagreement by consulting a third author and contacted trial investigators of identified trials to obtain additional information. We used standard methodological procedures expected by Cochrane.

Main results

We included one RCT (factorial design) that randomised 1621 participants.

This study compared the daily application of sunscreen compared with discretionary use of sunscreen, with or without beta-carotene administration, in the general population. The study was undertaken in Australia; 55.2% of participants had fair skin, and they were monitored for 4.5 years for new cases of BCC or cSCC assessed by histopathology. We found this study to be at low risk of bias for domains such as allocation, blinding, and incomplete outcome data. However, we found multiple unclear risks related to other biases, including an unclear assessment of possible interactions between the effects of the different interventions evaluated (that is, sunscreen and beta-carotene). We found no difference in terms of the number of participants developing BCC (n = 1621; risk ratio (RR) 1.03, 95% confidence interval (CI) 0.74 to 1.43) or cSCC (n = 1621; RR 0.88, 95% CI 0.50 to 1.54) when comparing daily application of sunscreen with discretionary use, even when analyses were restricted to groups without beta-carotene supplementation. This evidence was of low quality, which means that there is some certainty that future studies may alter our confidence in this evidence.

We reported adverse events in a narrative way and included skin irritation or contact allergy.

We identified no studies that evaluated other sun protection measures, such as the use of sun-protective clothing, sunglasses, or hats, or seeking the shade when outdoors.

Authors' conclusions

In this review, we assessed the effect of solar protection in preventing the occurrence of new cases of keratinocyte cancer. We only found one study that was suitable for inclusion. This was a study of sunscreens, so we were unable to assess any other forms of sun protection. The study addressed our prespecified primary outcomes, but not most of our secondary outcomes. We were unable to demonstrate from the available evidence whether sunscreen was effective for the prevention of basal cell carcinoma (BCC) or cutaneous squamous cell carcinoma (cSCC).

Our certainty in the evidence was low because there was a lack of histopathological confirmation of BCC or cSCC in a significant percentage of cases. Amongst other sources of bias, it was not clear whether the study authors had assessed any interaction effects between the sunscreen and beta-carotene interventions. We think that further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

PLAIN LANGUAGE SUMMARY

Sun protection (including sunscreens) to prevent basal cell carcinoma and cutaneous squamous cell carcinoma of the skin

What is the aim of this review?

The aim of this Cochrane Review was to find out if using topical sunscreen and physical barrier methods (such as sun-protective clothing, hats, sunglasses, and the active search for shade when outdoors) compared with no specific precautionary activity prevented the development of basal cell carcinoma (BCC) and cutaneous squamous cell carcinoma (cSCC) of the skin in adults and children.

What was studied in this review?

Keratinocyte cancer (BCC and cSCC of the skin) is the most commonly identified type of skin cancer. The main risk is exposure to ultraviolet radiation, which is a component of sunlight. Prevention has become an important way to manage this cancer, so it is important to assess the effectiveness of methods used to prevent keratinocyte cancer in the general population. In this review, we assessed the effects of using topical sunscreen and physical barrier methods (such as sun-protective clothing, hats, sunglasses, and the active search for shade when outdoors) compared with no specific precautionary interventions aimed at preventing the development of BCC and cSCC in adults and children.

We searched the medical literature up to May 2016 for randomised controlled trials that evaluated preventive strategies. We found only one study suitable for inclusion. This study compared the daily application of sunscreen (with or without beta-carotene, which is a precursor of vitamin A) compared with the occasional use of sunscreen (with or without beta-carotene) in the general population, without restriction by gender or age. The study was undertaken in Australia, where 1621 participants, 55% of them with fair skin, were monitored for 4.5 years for new cases of BCC or cSCC assessed by histopathology (which is a method used to detect cancerous cells under the microscope).

What are the main results of this review?

We found no difference between the number of people who developed BCC or cSCC in the two groups over the time period of the trial. So, there did not seem to be a difference in applying sunscreen daily compared with using it occasionally.

Key messages

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Our one included study was a study of sunscreens, so we were unable to assess any other forms of sun protection.

We identified no studies that evaluated other sun protection measures, such as the use of sun-protective clothing, sunglasses, or hats, or seeking the shade when outdoors.

We did not find evidence for the effectiveness of daily sunscreen for preventing BCC or cSCC compared with the occasional use of sunscreen. The certainty of the evidence was low, which means that future studies may alter this result.

Side effects from the sunscreen used with or without the addition of beta-carotene included a low percentage of cases of contact allergy and skin irritation.

How up to date is this review?

This review included studies identified up to May 2016.