

Sunscreen Use for Photoprotection in Skin of Color: A Literature Review

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ABSTRACT

Background: To understand the prevalence and types of publications addressing darker skin types within the existing evidence base for sunscreen use.

Evidence Review: PubMed was searched from 1988, the time point at which the first skin of color (SOC) article was identified, through December 2022 using PubMed's Medical Subject Headings terms and keyword searches in title and abstract, with and without terms for SOC and ethnicity. Identified articles were reviewed for relevance, de-duplicated, and categorized; results are summarized.

Findings: Of the 5927 articles on sunscreen overall, only 314 (5.3%) articles addressed SOC, with the majority published since 2007 and representing only 4% to 7% of total publications annually except in 2022 when the proportion of SOC articles was 23.5%. Of the articles on SOC, many reported sunscreen knowledge and patient behaviors (29%), but very few reported clinical trials (5%). The 3 conditions most often discussed were melasma, post-inflammatory hyperpigmentation, and dyschromia. South Asian ethnicities (India, Pakistan, Bangladesh) had the highest representation within the literature, followed by Hispanics.

Conclusions and Relevance: Although it was assumed there would be fewer papers discussing the use of sunscreen in darker skin types, the scale of the disparity revealed by this study is stark. The increase in a number of articles in 2022 suggests an increasing focus on SOC, but further discussion of the issues presented here will help the SOC community address gaps in the evidence base and better inform discussions on sunscreen and photoprotection between clinicians and patients.

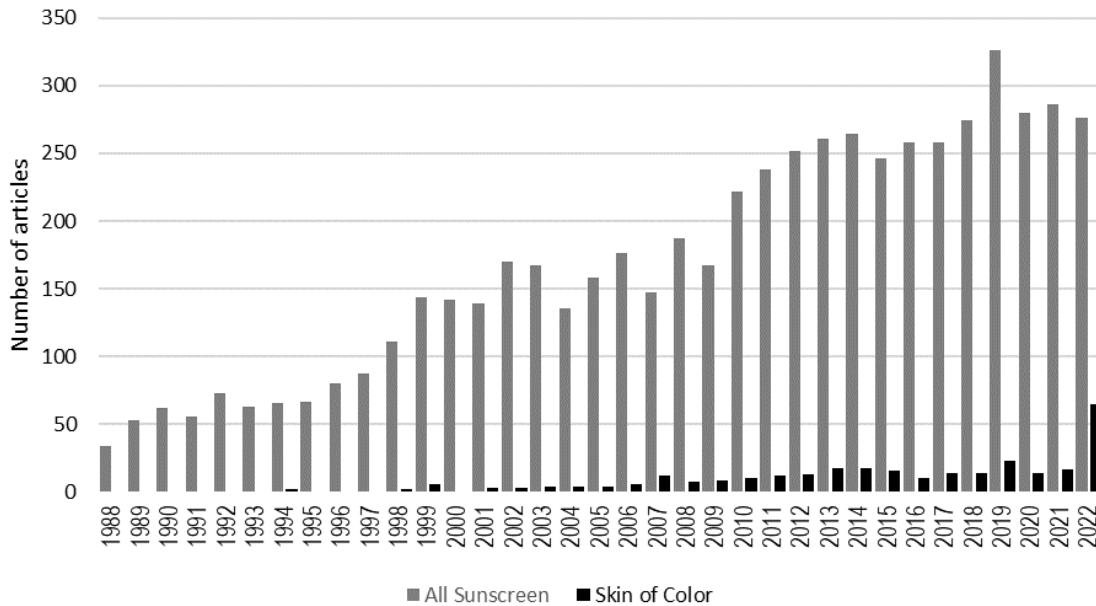
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INTRODUCTION

Misperceptions around the use of sunscreen for photoprotection for individuals with darker skin types result in the underutilization of this effective means to reduce the sequelae of sun exposure. The Physicians Council for Diversity, Equity, and Inclusion evaluated the prevalence and types of publications addressing darker skin types within the broader sunscreen medical literature. We hypothesized that a lack of clear guidance on the use of sunscreen in patients with darker skin types was due not only to the limited primary clinical evidence but also to poor representation in the broader dermatologic literature.

MATERIALS AND METHODS

PubMed was searched from 1988, the time point at which the first "skin of color" (SOC) article was identified, through December 2022 using PubMed's Medical Subject Headings terms (sunscreening agents) and free-text searches (eg, sunscreen, skin aging, melasma, post-inflammatory hyperpigmentation, dyschromia) in title, abstract, or keywords, with and without terms for SOC and race/ethnicity to capture peer-reviewed English-language literature presenting human data. Articles were included based on review of the titles and available abstracts for association with SOC or Fitzpatrick skin types IV-VI, specified racial and ethnic groups, and relevance

FIGURE 1. Sunscreen articles referencing skin of color (SOC) compared with all sunscreen articles.**TABLE 1.**

Articles by Type, Condition, and Race/Ethnic Group			
Article Type	Number of articles (mean number of publications per year*)		
	Total	1988-2015	2016+
Patient behavior	90 (2.6/yr)	ND	ND
Secondary interest	64 (1.8/yr)	ND	ND
Skin cancer prevention	44 (1.3/yr)	ND	ND
Guideline - best practice	39 (1.1/yr)	ND	ND
Clinical observation	33 (<1/yr)	ND	ND
Review	23 (<1/yr)	ND	ND
Clinical trial	15 (<1/yr)	ND	ND
Condition			
Melasma	41 (1.1/yr)	17 (<1/yr)	24 (3.4/yr)
Post-inflammatory hyperpigmentation	27 (<1/yr)	10 (<1/yr)	17 (2.4/yr)
Dyschromia	19 (<1/yr)	11 (<1/yr)	8 (1.1/yr)
Race or ethnic group			
South Asian (India, Pakistan, Bangladesh)	68 (1.9/yr)	36 (1.3/yr)	32 (4.6/yr)
Hispanic	50 (1.4/yr)	30 (1.1/yr)	20 (2.9/yr)
Asian (Chinese, Korean, Japanese)	41 (1.2/yr)	17 (<1/yr)	24 (3.4/yr)
Black	40 (1.1/yr)	30 (1.1/yr)	10 (1.4/yr)
American Indian	3 (<1/yr)	1 (<1/yr)	2 (<1/yr)
Hawaiian/Pacific Islander	1 (<1/yr)	1 (<1/yr)	0 (<1/yr)

ND, Not determined.

*Total number of articles in a category divided by 35 years (Total column), by 28 years (1988-2015 column) and by 7 years (2016+ column). Calculation not done where there was less than 1 article per year.

to the review objectives. Identified articles were de-duplicated and categorized by article topic and specified racial and ethnic groups.

RESULTS

Of the 5927 articles on sunscreen overall, only 314 (5.3%) articles addressed SOC. Over half were published since 2016; notably the proportion of SOC articles jumped to 23.5% in 2022 (Figure 1). Articles reported primarily on sunscreen knowledge and patient behaviors (29%), and few (5%) reported clinical trials (Table 1). Sunscreen use for SOC was most often discussed for 3 conditions (melasma, post-inflammatory hyperpigmentation, and dyschromia; Table 1). Reporting by specific racial and ethnic groups was sparse and showed no obvious time trends although comparing pre-2016 vs 2016 to 2022, South Asian and Asian ethnicities appeared to grow both in total publication volume and in relation to other racial groups (Table 1).

DISCUSSION

Despite people of color comprising ~25% of the US population, there is significant historical underrepresentation of these diverse racial and ethnic groups in the medical literature. Although it was assumed this would also be true for sunscreen literature, the scale of the disparity revealed by this analysis is stark. Only 4% of articles on sunscreen use referred to SOC, with half of those articles published since 2016. Our findings are consistent with Wilson et al, who found that only 2% to 62% (mean 17%) of articles published between 2018 and 2020 across 52 dermatology journals were relevant to SOC.¹ The identified sunscreen literature for South Asian and other Asian groups was substantially greater than for Hispanic and Black populations, while American Indian and Pacific Islander populations were greatly underrepresented. This is consistent with the observation of Wilson et al that 5 of the top 10 journals for SOC publications were based in Asia and that Asian dermatology journals (eg, *Indian Journal of Dermatology and Venereology and Leprology*) which also carried a high proportion of SOC articles.¹ Our findings also corroborate Patel et al's observation of limited representation in clinical trials (n= 92 published clinical trials between 1970 and 2020 and among those, darker skin was poorly represented [only 34%, 7%, and 0% of patients with Fitzpatrick skin types IV, V, and VI, respectively]).²

Sunscreen use for SOC has been neglected because of cultural beliefs and beauty standards, long-standing misconception that individuals with darker skin tones are naturally protected from the harmful effects of the sun, sunscreen formulation challenges, and healthcare disparities.³ The marked increase of representation of SOC in sunscreen literature we observed in 2022 hopefully reflects increased efforts to include racial and ethnic minority groups in research and to report patient demographics more transparently in research publications. Furthermore, significant formulation improvements that

provide better protection against ultraviolet A (UVA) and visible light and improve cosmesis are needed to address the needs of SOC. Patient education and medical training should address the misperception around sunscreen, its underutilization for SOC, and it should be emphasized to our patients of color that sunscreen is an essential, integral part of a skincare regimen to reduce adverse effects of ultraviolet (UV) exposure, including photoaging, UV-related disorders of pigmentation, and skin cancer.

DISCLOSURES

All members of the Physicians Council for Diversity, Equity, and Inclusion received honoraria from SkinCeuticals for their participation in the council. With no product or commercial interest discussed in this work, all authors declare no conflict of interest.

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