ORIGINAL ARTICLE

Sunburn and sun-protective behaviors among adults with and without previous nonmelanoma skin cancer (NMSC): A population-based study

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Background: Individuals with previous nonmelanoma skin cancer (NMSC) are at increased risk for subsequent skin cancer, and should therefore limit ultraviolet exposure.

Objective: We sought to determine whether individuals with previous NMSC engage in better sun protection than those with no skin cancer history.

Methods: We pooled self-reported data (2005 and 2010 National Health Interview Surveys) from US non-Hispanic white adults (758 with and 34,161 without previous NMSC). We calculated adjusted prevalence odds ratios (aPOR) and 95% confidence intervals (CI), taking into account the complex survey design.

Results: Individuals with previous NMSC versus no history of NMSC had higher rates of frequent use of shade (44.3% vs 27.0%; aPOR 1.41; 95% CI 1.16-1.71), long sleeves (20.5% vs 7.7%; aPOR 1.55; 95% CI 1.21-1.98), a wide-brimmed hat (26.1% vs 10.5%; aPOR 1.52; 95% CI 1.24-1.87), and sunscreen (53.7% vs 33.1%; aPOR 2.11; 95% CI 1.73-2.59), but did not have significantly lower odds of recent sunburn (29.7% vs 40.7%; aPOR 0.95; 95% CI 0.77-1.17). Among those with previous NMSC, recent sunburn was inversely associated with age, sun avoidance, and shade but not sunscreen.

Limitations: Self-reported cross-sectional data and unavailable information quantifying regular sun exposure are limitations.

Conclusion: Physicians should emphasize sunburn prevention when counseling patients with previous NMSC, especially younger adults, focusing on shade and sun avoidance over sunscreen. (J Am Acad Dermatol http://dx.doi.org/10.1016/j.jaad.2016.02.1236.)

Key words: multimodal sun protection; nonmelanoma skin cancer; photoprotection; skin cancer prevention; sunburn; sunscreen; ultraviolet exposure.

Nonmelanoma skin cancers (NMSC) are the most common of all human malignancies.[1] Individuals with previous NMSC are at increased risk for subsequent NMSC[2-5] and melanoma.[6-12] Ultraviolet (UV) radiation and sunburn are the main avoidable contributing factors to NMSC and

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melanoma.[1,13-15] Thus, it is advisable for individuals with previous NMSC to engage in sun-protective practices to help avoid harmful sun exposure and potentially prevent subsequent skin cancers. Two previous US studies suggest that people report engaging in better sun-protective practices after NMSC treatment[16,17]; however, evidence suggests that certain photoprotective practices may not necessarily translate into sunburn prevention.[18]

Our study uses nationally representative US data to: (1) examine whether those with previous NMSC engage in better photoprotection than those without history of skin cancer; and (2) examine correlates of recent sunburn among patients reporting previous NMSC.

CAPSULE SUMMARY

- Individuals generally improve sun-protective practices after nonmelanoma skin cancer treatment.
- Despite better sun-protective practices, these individuals do not have significantly lower odds of sunburn compared with individuals without previous skin cancer.
- Physician counseling should emphasize sunburn prevention, especially in young adults, focusing on shade and sun avoidance over sunscreen use.

METHODS

Study population

We obtained data from the National Health Interview Survey (NHIS), a nationally representative cross-sectional survey of the US civilian noninstitutionalized population that involves a complex survey design and population-based weights.[19] As detailed in Supplemental Figure 1 (available at http://www.jaad.org), we pooled self-reported data from 2005 (N = 31,428) and 2010 (N = 27,157), the most recent survey years with our questions of interest. Final adult response rates for the 2005 and 2010 NHIS were 69.0%[20] and 60.8%,[19] respectively. Analyses were restricted to non-Hispanic whites (N = 35,648), as NMSC primarily affects this population.[21] We excluded individuals reporting previous melanoma (N = 323) regardless of history of NMSC, reporting skin cancer of unknown kind (N = 352), or with missing responses to questions about previous cancer or NMSC (N = 54). Our study population thus included 758 patients reporting previous NMSC and 34,161 people without history of skin cancer. This study was exempt from Johns Hopkins University Institutional Review Board review.

Definitions of covariates

Intuitive categories for age at interview were chosen with consideration for the low incidence of NMSC at younger ages. Survey responses for gender, region of the United States, survey year, family history of skin cancer in any first-degree relative, highest level of education, and previous full-body skin examination were reported. Sun sensitivity was characterized as the effect of going out into the sun for an hour without photoprotection on the skin after several months of not being in the sun very much. Included responses were: (a) "get a severe sunburn with blisters," (b) "have a moderate sunburn with peeling," (c) "burn mildly with some or no darkening/tanning," (d) "turn darker without sunburn," (e) "nothing would happen to my skin," or (f) "do not go out in the sun." Survey questions quantifying sun exposure were not available, thus we included surrogate variables (body mass index [BMI] and physical activity level). For physical activity level, we summed the reported minutes of mild to moderate and vigorous activity per week and created categories (0, <180, 180-<360, ≥360 min/wk) using cut-points corresponding approximately to the 50th and 75th percentiles among those reporting physical activity.

Definitions of outcome variables

Survey respondents were asked 4 separate questions regarding how often they: (1) stay in the shade; (2) wear a hat that shades their face, ears, and neck, such as a hat with a wide brim all around; (3) wear a long-sleeved shirt; and (4) use sunscreen, when they go outside on a warm sunny day for more than 1 hour. For each of the 4 questions, we included responses of always, most of the time, sometimes, rarely, never, or "do not go out in the sun." We defined sun avoidance as a response of "do not go out in the sun" to any of 5 questions regarding sunscreen, long sleeves, hat, shade, or sun sensitivity. Among the remaining sun-exposed individuals (did not avoid the sun), we examined responses for questions 1 to 4 categorized as frequent (always or most of the time), sometimes, or rare (rarely or never). We defined those with frequent multimodal sun protection as sun-exposed individuals who reported frequent use of at least 2 of the 4 examined sun-protective methods (questions 1-4). Recent sunburn was characterized as sunburn within the last 12 months.

Statistical analysis

We performed multivariable logistic regression to estimate prevalence odds ratios (POR) for the