
Tanning accelerators: Prevalence, predictors of use, and adverse effects

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Background: Tanning accelerators are topical products used by indoor tanners to augment and hasten the tanning process. These products contain tyrosine, psoralens, and/or other chemicals.

Objective: We sought to better define the population using accelerators, identify predictors of their use, and describe any related adverse effects.

Methods: This cross-sectional study surveyed 200 indoor tanners about their tanning practices and accelerator use. Primary analysis compared accelerator users with nonusers with respect to questionnaire variables. Descriptive statistics and χ^2 contingency tables were applied to identify statistically significant variables.

Results: Of respondents, 53% used accelerators; 97% were female and 3% were male with a median age of 22 years (range: 19-67). Users were more likely to spray tan, tan frequently, and be addicted to tanning. Acne and rashes were more common in accelerator users. Adverse reactions to accelerators prevented their further use 31% of the time.

Limitations: A limited adult population was evaluated; exact accelerator ingredients were not examined.

Conclusions: Tanning accelerator users are high-risk indoor tanners who tan more frequently and who are more likely addicted to tanning. Acne and rashes are more common with these products and act as only mild deterrents to continued use. Additional research should investigate accelerators' longer-term health effects. (*J Am Acad Dermatol* 2015;72:99-104.)

Key words: indoor tanning; tanning accelerator; tanning addiction; tanning dependence; tanning lotions.

Several studies have shown that exposure to ultraviolet (UV) radiation from indoor tanning devices is associated with an increased risk of melanoma and nonmelanoma skin cancer.¹⁻⁵ Based on these data, the US Department of Health and Human Services and the International Agency for Research on Cancer panel have declared UV radiation from tanning beds and sun lamps as a known carcinogen.⁶ Despite the growing awareness that it poses a health threat, indoor tanning continues to grow exponentially. In the United States, at least 28 million people tan indoors annually, and of these, 2.3

Abbreviations used:

DSM-IV: *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*
SRD: substance-related disorder
UV: ultraviolet

million are teens.^{7,8} In a study of more than 10,000 children and adolescents, 35% of teenage girls were found to use tanning devices.⁹

A common practice among tanning bed users is to apply tanning accelerators. Tanning accelerators are

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topical lotions, creams, or sprays that are designed to deliver faster, deeper tans after exposure to UV radiation. These products are sold in tanning salons, and over 500 distinct varieties are available at Amazon.com. Tanning accelerators attribute their efficacy to tyrosine and plant extracts, such as bergamot orange (*Citrus bergamia*), lime (*Citrus aurantiifolia*), and fig-leaf (*Ficus carica*), all of which contain photo-sensitizing psoralens.

Very little is known about the effects of tanning accelerators or those who use them. There is only 1 report exploring the efficacy of tyrosine-based tanning accelerators,¹⁰ and no studies have examined psoralens or psoralen-containing botanical accelerators. This study was designed to reveal more about tanning accelerator use. For this purpose, a group of 200 indoor tanners were asked to complete a survey designed to assess the prevalence of tanning accelerator use, the reasons why they are used, and their adverse effects.

METHODS

A total of 200 indoor tanners were recruited between January and July 2013 to complete a 30-question survey for this cross-sectional study. Booths with signs reading "Do you indoor tan?" were set up at a university recreational center (55 participants) and 2 public beaches (70 and 75 participants each), neither of which had indoor tanning facilities. Individuals who approached the booths were offered surveys if they had both indoor tanned in the past year and were at least 19 years old (both study inclusion criteria). Age of at least 19 years was chosen to eliminate a parental consent form. Participants who completed surveys could voluntarily enter a drawing for a \$25 gift card. All study materials and procedures were approved by the university's institutional review board. Participants were limited to a single survey. All participants completed questionnaires anonymously. Ten questionnaires were excluded from the data set because respondents had answered fewer than 95% of the questions. If respondents indicated not using accelerators but answered questions pertaining to accelerators, those responses were also omitted from the analysis. Questions were designed to capture demographic data of respondents (age, sex, eye color, Fitzpatrick skin type), frequency of indoor tanning, use of spray tans, and use of tanning accelerators. To

better characterize tanning accelerator users, questions examined frequency and reasons for accelerator use and whether respondents had a favorite accelerator, used added bronzers (ie, dyes that darken the skin), and/or had experienced an adverse event with an accelerator. The survey also assessed participants' views on tanning accelerator efficacy and whether accelerators affected their risk of skin cancer.

Tanning addiction, which is associated with the production of endorphins stimulated by UV radiation, is a recently described disorder that can affect frequent tanners.¹¹ A series of questions was included to assess potential tanning addiction/addictive tendencies. Two measures frequently used to

define a substance-related disorder (SRD) were modified: the 4-item CAGE (cut down, annoyed, guilty, eye-opener) questionnaire, and the 7 diagnostic criteria for SRD as outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* as reported previously.¹¹ Two or more affirmative responses to questions on the modified CAGE questionnaire and 3 or more affirmative responses to items on the modified *DSM-IV* questionnaire were considered to indicate a likely SRD involving indoor tanning. For questions in the modified *DSM-IV-Text Revision* with multiple parts, scores were calculated using the method of Mosher and Danoff-Burg.¹² Tanning addiction was defined as meeting criteria for a SRD by both the CAGE and *DSM-IV* questionnaires, and tanning addiction tendency was defined as meeting criteria for either the CAGE or *DSM-IV* questionnaires but not both.

The primary analyses compared tanners who use accelerators with those who do not with respect to a number of variables. For categorical variables such as eye color, skin type, tanning frequency, tanning addiction (yes/no), and tanning addictive tendencies (yes/no), χ^2 contingency tables were used to compare tanning accelerator users with nonusers. For ordinal variables such as age, the Wilcoxon rank sum test was applied. Given that tanning frequency is used in the calculation for tanning addiction/addictive tendency, Cochran-Mantel-Haenszel tests were used to adjust for tanning frequency when comparing tanning addiction/addictive tendency among accelerator users and nonusers. All tests were conducted at the 2-sided .05 significance level. Software (SAS, Version 9.3, SAS Institute Inc, Cary, NC) was used for calculations.

CAPSULE SUMMARY

- Tanning accelerators are topical products designed to deliver faster, deeper tans after ultraviolet exposure.
- Women who tan frequently and have tanning addiction/addiction tendencies are more likely to use accelerators.
- Accelerator use may therefore identify higher-risk indoor tanners.

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