

# Topical Corticosteroid Phobia in Atopic Dermatitis

## A Systematic Review

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**IMPORTANCE** Topical corticosteroid (TCS) phobia refers to the negative feelings and beliefs related to TCSs experienced by patients and patients' caregivers. This phenomenon may be a major contributing factor in treatment failure in patients with atopic dermatitis, yet it has been sparsely described in the literature.

**OBJECTIVE** To systematically assess the nomenclature, prevalence, origins, and effect on treatment adherence of TCS phobia in atopic dermatitis.

**EVIDENCE REVIEW** A literature search was conducted using specific eligibility criteria across electronic databases, including Ovid (MEDLINE, EMBASE), PubMed, and Web of Science, for articles published from January 1, 1946, to October 31, 2016. Included articles must have assessed TCS phobia in patients with atopic dermatitis or their caregivers. Quality ratings of studies were based on a modified version of the Oxford Centre for Evidence-Based Medicine quality rating scheme for individual studies.

**FINDINGS** Of the 490 articles identified by literature search, 16 met the eligibility criteria. All studies were cross-sectional. Topical corticosteroid phobia prevalence ranged from 21.0% (95% CI, 15.8%-26.2%) to 83.7% (95% CI, 81.9%-85.5%). There was significant variation in how phobia was defined, ranging from concern to irrational fear. Questionnaires used to assess for TCS phobia included 1 to 69 questions. In the 2 studies that compared nonadherence between a phobia group and a nonphobia group, patients in both phobia groups were found to have a significantly higher rate of nonadherence (49.4% vs 14.1% and 29.3% vs 9.8%). The sources from which patients were receiving information about corticosteroids included physicians, friends and relatives, broadcast media, print media, and the internet.

**CONCLUSIONS AND RELEVANCE** Features of TCS phobia are commonly reported by patients across cultures and may be associated with a higher rate of nonadherence. Patients with TCS phobia and the sources from which patients are receiving information about corticosteroids may be targetable for intervention to increase adherence to treatment regimens. The nomenclature and assessment methods for TCS phobia used in studies, however, lack standardization, precluding quantitative comparison and extrapolation of data. Additional research, using standardized definitions and methods of assessment, is needed to better characterize this phenomenon and evaluate the efficacy of potential interventions.

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**A**topic dermatitis (AD) is a common skin disease, with up to 31.6 million people affected in the United States.<sup>1</sup> The onset of AD is usually in childhood, with 60% of patients with AD experiencing an eruption in their first year of life.<sup>2</sup> Although often thought of as a disease of childhood, AD can also be a lifelong illness.<sup>3,4</sup> While there is currently no definitive cure for AD, topical corticosteroids (TCSs) are effective treatment in most patients requiring pharmacologic intervention.<sup>5</sup> Nonadherence to TCS treatment, however, is common and can lead to treatment failure and a subsequent decrease in quality of life.<sup>6,7</sup> Although the reasons underlying patient nonadherence are complex and multifactorial, TCS phobia is a likely contributor.<sup>8</sup>

Originally used to describe an irrational fear of corticosteroids, the definition of TCS phobia has since been broadened to include the vague negative feelings and beliefs about TCSs held by patients.<sup>9</sup> Some authors have suggested that TCS phobia is a misnomer given the potential for long-term adverse effects from high-dose TCS use and that this phenomenon is likely to have been borne from misinformation as opposed to irrationality.<sup>10,11</sup> It would follow, then, that targeted patient and physician education may decrease TCS phobia and improve adherence to treatment and clinical outcomes in dermatologic diseases that are treated with TCSs.

The objective of this review is to investigate the nomenclature, prevalence, causes of concern, sources, and effects on treatment adherence of TCS phobia in patients with AD and their caregivers. A better understanding of TCS phobia will enhance clinicians' ability to provide personalized education for their patients and colleagues about the safety and efficacy of TCSs, thereby increasing adherence and decreasing morbidity related to AD.

## Methods

### Search Strategy

We searched Ovid (MEDLINE, EMBASE), PubMed, and Cochrane reviews for articles published from January 1, 1946, to October 31, 2016, using combinations of search terms including *topical steroid*, *corticosteroid*, *phobia*, *concern*, *worry*, *fear*, *anxiety*, *atopic dermatitis*, and *eczema*. Our search strategy is presented in the eTable in the [Supplement](#).

### Study Selection Criteria

#### Inclusion Criteria

Retrieved English-language articles were initially screened for relevance by title and abstract. Included articles must have assessed for TCS phobia within the studied patient population, with TCS phobia defined by 1 or more of the following criteria: (1) explicitly described within the article as TCS phobia by authors and (2) worries, anxieties, fears, concerns, or reluctance related to TCS use.

The studies must have assessed TCS phobia in patients with AD. Articles that discussed other skin disorders were included if the AD subpopulation was assessed separately and subpopulation data were provided.

Because of the anticipated low number of studies and lack of uniformity regarding phenomenon definition, we included relevant published studies in most study designs. Case reports and case series were excluded due to the sample sizes, which were anticipated to be much lower than the sample sizes of cross-sectional studies.

## Key Points

**Question** What are the prevalence, origin, and effect on treatment adherence of topical corticosteroid phobia in atopic dermatitis?

**Findings** In this systematic review, the prevalence of topical corticosteroid phobia ranged from 21.0% to 83.7%; compared with patients without phobia, patients reporting phobia had higher nonadherence rates. Patients receive misinformation about topical corticosteroids from a variety of sources, including health care workers, friends and relatives, print media, and the internet.

**Meaning** Topical corticosteroid phobia is a widespread and cross-cultural phenomenon; recognition may identify potential targets for intervention and opportunities to increase treatment adherence.

### Exclusion Criteria

Abstracts, review articles, case reports, or case series were excluded. Studies assessing TCS phobia in patients who had other dermatologic diseases other than AD and those reporting TCS phobia in individuals who were providing care for patients who had other dermatologic diseases besides AD were also excluded.

### Quality Assessment

The quality rating scheme used was modified from the Oxford Centre for Evidence-Based Medicine for ratings of individual studies: (1) properly powered and conducted randomized clinical trial or systematic review with meta-analysis, (2) well-designed controlled trial without randomization or prospective comparative cohort trial, (3) case-control study or retrospective cohort study, (4) case series with or without intervention or cross-sectional study, and (5) opinion of respected authorities or case reports. The quality assessment was performed by 2 of the authors (A.W.L. and E.S.Y.). Disagreement was resolved with discussion and consensus. Results of the quality assessment are presented in the Results section.

### Data Synthesis and Outcomes

Two authors (A.W.L. and E.S.Y.) independently extracted the data using an electronic spreadsheet. Disagreement was resolved with discussion and consensus. Data from the included studies were combined and evaluated for the outcomes. The primary outcomes were nomenclature of TCS phobia and prevalence of TCS phobia. The secondary outcomes were nonadherence attributed to TCS phobia, causes of concern related to TCS phobia, and sources from which patients receive information about TCSs.

## Results

### Sampled Articles

Our initial search resulted in 676 total articles (eFigure in the [Supplement](#)). Duplicate articles (n = 186) were removed, and the remaining 490 articles were screened by 2 reviewers (A.W.L. and E.S.Y.) independently. The initial screen yielded 38 relevant articles. Of these, 16 articles published between 1996 and 2016 remained after exclusion criteria were applied ([Table 1](#)).<sup>8-23</sup> All included articles were

Table 1. Characteristics of Included Studies and Descriptions of TCS Phobia Used Within Studies

| Source                                     | Countries  | Sample Size and Age of Participants   | Used Phrase "Steroid Phobia" | Paraphrased Definition  |
|--|--|---|------------------------------|---|
| Fischer, <sup>12</sup> 1996                | Australia  | N = 109 parents of pediatric patients with AD; mean age, NR   | No                           | Apprehension about cortisone; distrust of cortisone   |
| Charman et al, <sup>9</sup> 2000           | United Kingdom   | N = 200 adult patients and caregivers of pediatric patients with AD; mean age, 13 y   | Yes                          | Irrational fear of TCSs   |
| Fukaya, <sup>13</sup> 2000                 | Japan  | N = 1558 adult patients with AD; mean age, NR   | No                           | Feelings of resistance about using TCSs   |
| Ohya et al, <sup>14</sup> 2001             | Japan  | N = 205 parents of pediatric patients with AD; mean (SD) age, 6.9 (4.9) y   | Yes                          | Anxiety about using TCSs  |
| Barbeau and Lalonde, <sup>15</sup> 2006    | Canada   | N = 77 adult patients and parents of pediatric patients with AD; mean age, 38 y   | No                           | Concern about using TCSs  |
| Hon et al, <sup>16</sup> 2006              | China (Hong Kong)  | N = 165 parents of pediatric patients with AD; median age, 11.6 y (mild AD), 10.6 y (moderate-severe AD)  | No                           | Corticosteroid fear, concerns or fears expressed about corticosteroid use   |
| Zuberbier et al, <sup>17</sup> 2006        | United States, France, Germany, Spain, United Kingdom, the Netherlands, Mexico, Poland | N = 2002 adult patients and patient caregivers of pediatric patients with AD; mean age, NR  | No                           | Concern regarding use of TCSs   |
| Zuberbier et al, <sup>18</sup> 2008        | Germany  | N = 401 patients with AD; mean age, NR  | Yes                          | Concerns and negative associations about the use of corticosteroids   |
| Aubert-Wastiaux et al, <sup>8</sup> 2011   | France   | N = 208 adult patients and parents of pediatric patients with AD; mean (SD) age (pediatric patients), 4.9 (4) y; mean age (adult patients), 30.5 (10) y | Yes                          | All types of fear about corticosteroid use  |
| Kojima et al, <sup>19</sup> 2013           | Japan  | N = 436 caregivers of pediatric patients with AD; mean age, NR  | Yes                          | Irrational fear of TCSs   |
| Hon et al, <sup>10</sup> 2015              | China (Hong Kong)  | N = 161 adult patients and parents of pediatric patients with AD; mean age, NR  | No                           | Glucocorticoid fear, concern or worry about glucocorticoids   |
| Huynh et al, <sup>20</sup> 2015            | Singapore  | N = 110 adult patients with AD; median age, 55.5 y  | Yes                          | Fear of TCSs and concern about adverse effects  |
| Lee et al, <sup>21</sup> 2015              | Korea  | N = 126 parents of pediatric patients with AD; mean (SD) parent age, 36.8 (6.4) y; mean patient age, 7.5 (4.8) y  | Yes                          | Unwarranted fear of TCSs  |
| Gonzales et al, <sup>22</sup> 2017         | France   | N = 169 parents of pediatric patients with AD; mean age, 5.5 y  | Yes                          | Fear about the use of TCSs  |
| Gustavsen and Gjersvik, <sup>11</sup> 2016 | Norway   | N = 77 parents of pediatric patients with AD; mean age, NR  | Yes                          | Negative attitudes toward TCSs  |
| Kotrulja et al, <sup>23</sup> 2016         | Croatia  | N = 238 parents of pediatric patients with AD; mean age, NR   | Yes                          | Defined by patients who erroneously thought that short-term applications of TCSs could cause skin atrophy or patients who thought TCSs were extremely dangerous |

Abbreviations: AD, atopic dermatitis; NR, not recorded; TCS, topical corticosteroid.

cross-sectional studies and had a score of 4 according to the quality rating scheme modified from the Oxford Centre for Evidence-Based Medicine for ratings of individual studies.

### Nomenclature of TCS Phobia

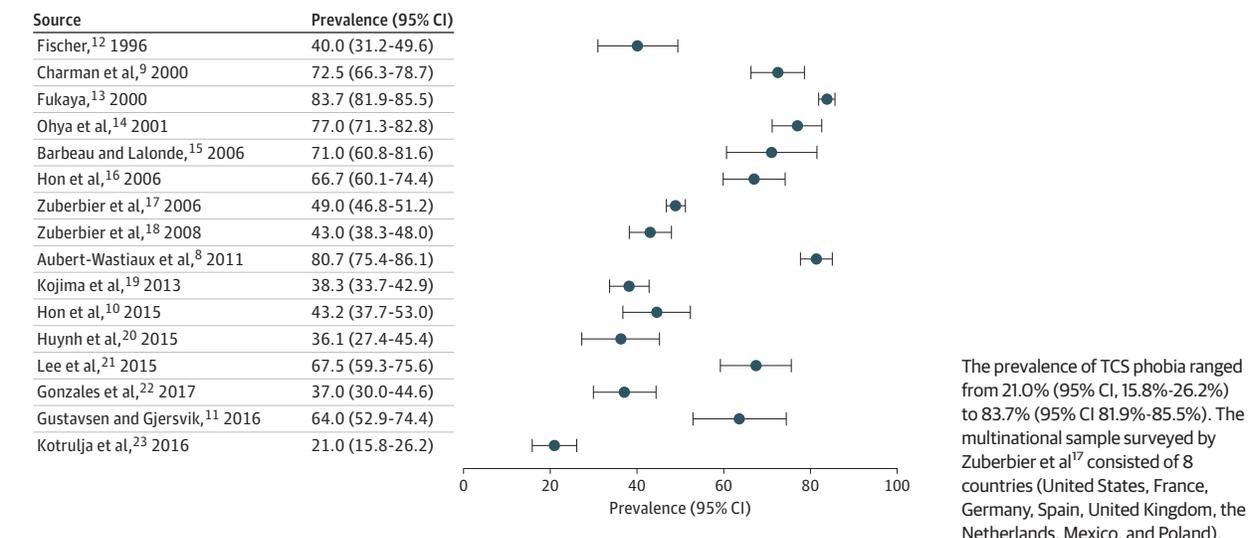
Ten of the 16 studies included in this review used the word *phobia* to describe the phenomenon assessed by the authors. In the articles using phobia, there was variation in how the term was defined (Table 1). Three authors described TCS phobia as the irrational and/or unwarranted fear of TCSs. Two authors defined TCS phobia in a broader sense, encompassing a general sense of fear related to TCS use and not just the irrational fear.<sup>8,20</sup> One author referred to the phenomenon as "corticophobia."<sup>23</sup> Other authors described steroid phobia as concern and anxiety about TCS use.<sup>14,15,17</sup> Hon et al<sup>10,16</sup> did not use the phrase steroid phobia to

describe the observed phenomenon but instead used steroid fear. The authors believed that steroid fear would be a better descriptor given the lack of studies demonstrating that this fear was irrational. The other articles that did not use the phrase TCS phobia described the observed phenomenon as concern, distrust, or feelings of resistance regarding TCSs.<sup>11-13,15,17,18</sup>

### Prevalence of TCS Phobia

All of the included articles reported the prevalence of TCS phobia within each studied patient population (Figure). The prevalence of TCS phobia ranged from 21.0% (95% CI, 15.8%-26.2%) to 83.7% (95% CI, 81.9%-85.5%).<sup>8-23</sup> The lowest prevalence of TCS phobia was reported by Kotrulja et al,<sup>23</sup> with the population surveyed including only caregivers of pediatric patients (n = 238) in Croatia. The highest prevalence was found in a study performed

Figure. Prevalence of Topical Corticosteroid (TCS) Phobia



in Japan by Fukaya<sup>13</sup> that included only adult patients (n = 1558). The number of study participants ranged from 73 to 2002.<sup>15,17</sup>

### Nonadherence and TCS Phobia

Ten of the included articles reported the overall nonadherence rates of the studied patient population, but only 2 studies compared the nonadherence rates between patients with and without TCS phobia.<sup>19,21</sup> The difference in clinical outcomes in patients with and without phobia could not be assessed given the cross-sectional design of these studies. Lee et al<sup>21</sup> found a higher proportion of patients with TCS phobia reporting a history of partial adherence (42 of 85 [49.4%]) or nonadherence (12 of 85 [14.1%]) compared with the proportion of patients without TCS phobia reporting a history of partial adherence (12 of 41 [29.3%]) or nonadherence (4 of 41 [9.8%]) (Fisher exact test,  $P = .04$ ). Similarly, Kojima et al<sup>19</sup> found a higher proportion of patients with TCS phobia who reported nonadherence (90 of 156 [57.7%]) compared with the proportion of patients without TCS phobia who reported nonadherence (63 of 252 [25.0%]) ( $\chi^2$  test,  $P < .001$ ).

### Causes of Concern Related to TCS Phobia

Five of the included studies surveyed patients about causes of concern related to TCS phobia.<sup>9,10,16,17</sup> The 4 studies reporting more than 1 concern related to TCS phobia are summarized in Table 2. The most frequent concern was skin thinning. The potential for TCS to affect growth and development was the second most frequent concern.

### Sources of TCS Phobia

Four studies investigated the sources from which the patients were receiving information about TCSs (Table 3).<sup>9,16,21</sup> In 3 of the studies, patients were allowed to choose more than 1 source; however, data regarding the total number of mentions of each source were not available. Physicians and health care workers were listed as 1 of the top 3 sources of information about TCSs in all 4 studies; only 2 of these studies specified physician specialty.

## Discussion

Topical corticosteroids have been the mainstay of treatment for most patients with AD who require pharmacologic treatment for many decades and remain so despite recent advances in nonsteroidal topical treatment options.<sup>5</sup> While severe adverse effects of TCSs, such as Cushing syndrome and permanent skin atrophy, are well known, they rarely occur when TCSs are used properly.<sup>24</sup> A review of 16 trials involving the use of TCSs that assessed for hypothalamic-pituitary-adrenal axis suppression found that only 1 trial had reported participants who experienced symptoms of adrenocorticoid insufficiency on withdrawal of TCSs.<sup>25</sup> These cases involved use of more than 100 g of clobetasol propionate, 0.05%, cream or ointment weekly for 10 weeks to 18 months in the treatment of adult psoriasis.<sup>26</sup> Another review found 25 pediatric cases documenting hypothalamic-pituitary-adrenal axis suppression.<sup>24</sup> Most of these cases, however, involved use of midstrength to potent TCSs (beta-methasone valerate and clobetasol propionate) for prolonged periods (1-17 months) to treat diaper eczema.<sup>24</sup> Mooney et al<sup>24</sup> cited several studies suggesting that routine, long-term use of TCSs for management of AD does not cause skin atrophy.<sup>27,28</sup> In a cross-sectional observational study involving 70 pediatric patients with AD treated regularly with TCSs in a range of potencies for at least 3 months, no evidence of atrophy was found when comparing cutaneous sites exposed to TCSs and nonexposed sites<sup>27</sup> using a previously validated, 5-point dermoscopic scale based on changes in skin transparency and dermatoglyphics.<sup>29</sup> In a randomized controlled trial involving 112 adults with AD treated with daily fluticasone propionate, 0.005%, ointment for 2 weeks followed by twice-weekly application, no evidence of atrophy was found on serial skin biopsies of those treated with TCSs compared with placebo.<sup>28</sup>

Despite their safety, the use of TCSs is often met with anxiety and fear by patients, and TCS phobia is being increasingly recognized as playing a key role in poor treatment adherence in AD.

**Table 2. Concerns Related to Topical Corticosteroid Phobia**

| Source  | Sample Size, No. | Concern Ranking                                     |   |   |   |  |
|---|------------------|---|---|---|---|--|
|   |                  | First   | Second  | Third   | Fourth  | Fifth  |
| Charman et al, <sup>9</sup> 2000 <sup>a</sup> | 200              | Skin thinning: 34.5% (95% CI, 27.9%-41.1%)          | Nonspecific long-term effects: 24.0% (95% CI, 18.1%-29.9%)            | Growth and development: 9.5% (95% CI, 5.4%-13.6%)       | Aging/wrinkling: 3.5% (95% CI, 1.0%-6.0%)   | Changes in skin color: 3.0% (95% CI, 0.6%-5.4%)          |
| Zuberbier et al, <sup>17</sup> 2006           | 2002             | Skin thinning: 28.0% (95% CI, 26.0%-30.0%)          | Treatment resistance: 18.0% (95% CI, 16.3%-19.7%)                     | Skin bleaching: 17.0% (95% CI, 15.4%-18.6%)             | Burning sensation: 15.0% (95% CI, 13.4%-16.6%)  | Rebound symptoms: 15.0% (95% CI, 13.4%-16.6%)            |
| Hon et al, <sup>16</sup> 2006 <sup>a</sup>    | 165              | Growth and development: 30.3% (95% CI, 23.3%-37.3%) | Skin thinning: 27.3% (95% CI, 20.5%-34.1%)                            | Miscellaneous <sup>b</sup> : 12.7% (95% CI, 7.6%-17.8%) | Other skin adverse effects besides thinning <sup>c</sup> : 10.3% (95% CI, 5.7%-14.9%) | Affects liver/kidney function: 7.7% (95% CI, 3.6%-11.8%) |
| Hon et al, <sup>10</sup> 2015 <sup>a</sup>    | 161              | Skin thinning: 55.3% (95% CI, 47.3%-62.7%)          | Other skin adverse effects <sup>c</sup> : 16.1% (95% CI, 10.3%-21.7%) | Growth and development (16.1%, 95% CI 10.3%-21.7%)      | "Don't know:" 13.7% (95% CI, 8.4%-19.0%)  | Bone problems: 13.0% (95% CI, 7.8%-18.2%)                |

<sup>a</sup> Percentages do not sum to 100% since the study population reported more than 5 concerns.

<sup>b</sup> Including effects on sexual characteristics, endocrine system, respiratory

system, circulatory system, musculoskeletal system, health in general, oncogenesis, and obesity.

<sup>c</sup> Including pigmentation, thickening, atrophy, irritation, and texture.

**Table 3. Sources From Which Patients Receive Information About TCSs**

| Source  | Sample Size, No. | Frequency Ranking of TCS Information Source        |  |  |   |  |
|---|------------------|--|--|--|---|--|
|   |                  | First  | Second   | Third  | Fourth  | Fifth                                  |
| Charman et al, <sup>9</sup> 2000 <sup>a</sup>           | 200              | General practitioners: 33.0% (95% CI, 26.5%-39.5%) | Magazines/newspapers: 17.5% (95% CI, 12.2%-22.8%)          | Friends: 14.5% (95% CI, 9.6%-19.4%)  | Family: 11.5% (95% CI, 7.1%-15.9%)                | Pharmacist: 10.5% (95% CI, 6.3%-14.7%) |
| Hon et al, <sup>16</sup> 2006 <sup>b</sup>              | 165              | Doctors <sup>c</sup> : 65.0% (95% CI, 57.9%-72.1%) | Newspapers: 62.0% (95% CI, 54.7%-69.3%)                    | Friends/relatives: 57.0% (95% CI, 49.6%-64.4%)                               | Television: 52.0% (95% CI, 44.5%-59.5%)           | Internet: 17.0% (95% CI, 11.4%-22.6%)  |
| Lee et al, <sup>21</sup> 2015 <sup>b</sup>              | 126              | Internet: 49.2% (95% CI, 40.5%-57.9%)              | Television/broadcasting media: 45.2% (95% CI, 36.5%-53.9%) | Doctors/health care professionals <sup>c</sup> : 37.3% (95% CI, 28.9%-45.7%) | Magazines/newspapers: 34.1% (95% CI, 25.8%-42.4%) | NR                                     |
| Gustavsen and Gjersvik, <sup>11</sup> 2016 <sup>b</sup> | 77               | Dermatologists: 70.0% (95% CI, 59.8%-80.2%)        | General practitioners: 55.0% (95% CI, 43.9%-66.1%)         | Package leaflets: 46.0% (95% CI, 34.9%-57.1%)                                | Pharmacies: 38.0% (95% CI, 27.2%-48.8%)           | NR                                     |

Abbreviations: NR, not recorded; TCS, topical corticosteroid.

<sup>a</sup> Percentages do not sum to 100% since the study population reported more than 5 sources.

<sup>b</sup> Percentages do not sum to 100% since the study population was allowed to report more than 1 source of information.

<sup>c</sup> Specialty or area of expertise not specified.

In this review, we have highlighted the pervasive and cross-cultural nature of this phenomenon. The studies included in our sample span 16 countries (United States, France, Germany, Spain, United Kingdom, the Netherlands, Mexico, Poland, Hong Kong, Japan, Korea, Australia, Canada, Croatia, Singapore, and Norway), and at least one-fifth of the patient population in each study was affected by TCS phobia.

Despite a growing recognition of TCS phobia, the methods characterizing and defining this phenomenon still lack standardization. The variation of nomenclature found within these studies is one such example. While most of the included studies used the phrase steroid phobia, we found differences in nomenclature in describing a similar concept. Even within the articles that used the term steroid phobia, the authors' definitions of the phrase varied. Also lacking in standardization is the method by which TCS phobia is assessed. Although all of the studies used questionnaires, these questionnaires varied in length from 1 to 69 questions. The wording of the questions and answer choices was also varied; for instance, some used multiple choice responses, while others used yes/no choices or visual analog scales.

This variability highlights the need to standardize the reporting of data related to TCS phobia. One solution to this challenge is the TOPICOP scale, a 12-item questionnaire that was developed by

Moret and colleagues<sup>30</sup> in 2013 as a standardized assessment tool for TCS phobia. Instead of using a binary yes or no answer choice to establish the presence of TCS phobia, the TOPICOP scale uses 12 items to characterize beliefs and worries related to TCSs. In this way, the authors believe that the scale will not only be able to better characterize TCS phobia but also discern the relative effect that these worries and beliefs have on treatment adherence. The TOPICOP scale is currently being further validated as a standardized method of measuring TCS phobia in patients with AD.<sup>22,31</sup>

Assessing for TCS phobia at the onset of a new patient-physician relationship could provide a potential target for early intervention by physicians and an opportunity to increase patient adherence with focused counseling. Our review identifies 2 particular areas of concern for patients: skin thinning and effect on growth and development. These areas may warrant extra attention and could yield additional benefit through counseling. For example, physicians can recognize skin atrophy as a potential adverse effect while reassuring patients and caregivers that it is rare when TCSs are used as prescribed for AD. With appropriate surveillance, skin atrophy, should it occur, can be diagnosed early in its course and treated appropriately.<sup>32</sup> Regarding the potential for growth retardation, caregivers may be reassured that this adverse event occurs only when high levels of TCSs are absorbed

into the system and that catch-up growth is to be expected after discontinuation of TCSs.<sup>33</sup> Lastly, it may be helpful to not only give patients detailed written instructions about TCS application but also review the instructions together while answering any questions or concerns that patients and their caregivers may have. At the closure of the clinic visit, misinformation can be clarified by asking patients and their caregivers what they understood about the prescribed medication regimen. In one study evaluating the influence of patient education on TCS phobia, a 10- to 15-minute educational session led by a dermatologist with written instructions resulted in a 43.2% decrease in the phobia index score.<sup>21</sup>

Interventions may also target the sources of TCS phobia. Physicians and pharmacists, for example, could be better equipped with continuing education sessions and revised guidelines on safe TCS use in the treatment of AD.<sup>34</sup> Primary care clinicians, in particular, may be a high-yield population to target, as many family practitioners, pediatricians, and internists treat patients with AD and likely play a key role in shaping patients' perceptions of TCSs. In one qualitative study based on parent focus groups, insufficient information and conflicting opinions about TCSs from primary care clinicians and pharmacists were listed as sources of anxiety and confusion in AD treatment.<sup>35</sup> Physicians or medical organizations may consider expanding their internet presence to clarify treatment misinformation and increase awareness of evidence-based sources of medical information.<sup>36</sup> In future research, assessing the sources of information in further detail (specialty of physicians, specific websites, and specific television programs) would be useful in focusing these edu-

cational interventions. In addition, investigation of racial and/or ethnic differences in the prevalence of TCS phobia may be helpful in identifying at-risk populations to target with these educational interventions.

### Limitations

Limitations of our study include the exclusion of non-English-language articles and conference abstracts that may have resulted in potentially relevant studies being overlooked. Given the lack of consensus surrounding the nomenclature of TCS phobia, our search strategy, although broad, may have failed to identify additional articles of relevance.

### Conclusions

Topical corticosteroid phobia is a pervasive and global phenomenon that has implications for patient adherence and treatment outcomes in AD. Improved standardization of the definition and assessment of this phenomenon is needed, as the variability found in the studies precludes purposeful comparison and extrapolation of the data for clinical application. Additional studies, using standardized methods of assessment to further characterize and understand this important phenomenon, are needed. Future research endeavors should work toward the development of well-controlled studies assessing interventions that may reduce TCS phobia and improve treatment outcomes in AD.

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*Study concept and design:* Li, Antaya.

*Acquisition, analysis, or interpretation of data:* All authors.

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*Critical revision of the manuscript for important intellectual content:* All authors.

*Statistical analysis:* Li.

*Administrative, technical, or material support:* Antaya.

*Supervision:* Antaya.

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