

# Self-Diagnosed Sensitive Skin in Women with Clinically Diagnosed Atopic Dermatitis

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## Abstract

**Background:** Sensitive skin is largely self-diagnosed and linked to reactions on exposed skin. Possible manifestations on genital skin are not well documented. Atopy may be predisposing.

**Objective:** To investigate the potential relationship between clinically diagnosed atopic dermatitis and either self-diagnosed sensitive skin or self-diagnosed genital sensitivity, and to evaluate the differences between atopics and non-atopics in perceived skin sensitivity to certain environmental conditions and certain common products.

**Methods:** A survey on self-perceived sensitive skin and genital sensitivity was administered to two groups of female patients attending a dermatology clinic: a group clinically diagnosed with atopic dermatitis (n = 25) and a control group of non-atopic individuals (n = 25).

**Results:** A significantly higher proportion of patients with atopic dermatitis described their skin as very or moderately sensitive. Factors reported to cause skin irritation included environmental conditions (cold weather, wind, rough fabric, stress), personal products (personal cleansing products, facial cleansers, moisturizers, alpha hydroxy acids, and perfumes) and laundry products.

**Conclusions:** A statistical association was found between clinically diagnosed atopic dermatitis and both self-diagnosed sensitive skin and self-diagnosed genital skin sensitivity. Atopic patients perceived their skin to be sensitive, longstanding, and moderate to severe, and were more likely to seek products formulated for sensitive skin. Atopy was also associated with genital sensitivity to hygiene pads and rough fabrics.

**Keywords:** sensitive skin, atopic dermatitis, genital sensitivity, sensory effects, subjective skin effects

## Introduction

The complex problem of sensitive skin is an area of considerable research interest. (1, 2) The term “sensitive skin” often implies a self-perceived reduced tolerance to topical products such as cosmetics or toiletries. A substantial proportion of women consider themselves to have sensitive skin. Surveys indicate that over 50% of women in the U.K. and the U.S. describe themselves as having sensitive skin. (3, 4) Understanding the nature of self-diagnosed sensitive skin will allow manufacturers to develop products to better meet the needs of this population.

Self-diagnosed sensitive skin varies in its presentation. The perception of sensitive skin is based on sensory (stinging, itching, burning, dryness) or visible reactions (erythema, wheal and flare, papules, scaling and desquamation) to certain products. (5) People with sensitive skin vary not only in the signs and symptoms they experience, but also in the degree of sensitivity at different body sites. Green (2000) tested sensory responses to capsaicin on the forearm and the face and found that some people were more sensitive on the face while others were more sensitive on the forearm. (6) People who report sensitivity to one irritant may not be generally susceptible to other types of irritants. One person may have a pronounced sensory response to substance A, but not to substance B, whereas another may report the converse.

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Little or no data have been published with regard to genital involvement in self-diagnosed sensitive skin. Vulvar skin differs from exposed skin in its permeability and susceptibility to certain irritants. (7) Britz and Maibach (1979) found that vulvar skin was significantly more reactive than forearm skin to benzalkonium chloride and maleic acid. (8) However, Elsnier et al. (1990), found that vulvar skin was slightly less reactive than the forearm to low concentrations of sodium lauryl sulfate (SLS). (9)

An association between sensitive skin and atopy has been reported, as reviewed in Farage, et al. (2006). (2) Willis, et al. (2001) reported that an atopic diathesis was significantly more prevalent among women who regarded themselves as having sensitive skin compared to those who did not. (3). However, atopy is not universally predictive of sensitive skin since a large percentage of atopic women (34%) described themselves as non-sensitive.

Our objective was to further investigate the potential relationship between clinically diagnosed atopic dermatitis and either self-diagnosed sensitive skin or self-diagnosed genital sensitivity. Further, we wished to investigate the differences between atopics and non-atopics in perceived skin sensitivity to certain environmental conditions, and certain common products that individuals encounter in everyday life. A questionnaire designed to identify people who perceived their skin to be sensitive was administered to two groups of female patients in a dermatology clinic: one with clinically diagnosed atopic dermatitis and a control group with unrelated complaints. We tested the possible link between the clinical diagnosis of atopic dermatitis and individuals' perception of sensitive skin in general and genital skin sensitivity in particular.

## Methods

The study was conducted between May and July of 2005. A questionnaire was given to two groups of 25 female patients each from a dermatology clinic in Athens, Greece, staffed by one of the authors (Dr. Katsarou): one group who had been diagnosed with atopic dermatitis by a dermatologist at the clinic, and a control group who presented with complaints unrelated to atopic dermatitis.

The survey required clinic patients to identify whether or not they perceived their skin to be sensitive; their perceived degree of sensitivity; the products, ingredients or environmental conditions

that elicited reactions; the experience of genital symptoms; and whether or not purchases were influenced by claims such "hypoallergenic" or "safe for sensitive skin".

Fisher's exact tests were performed to determine if the frequency of specific responses for the atopic group (i.e. individuals with medically diagnosed atopic dermatitis) were significantly different from the control group (non-atopic individuals). Chi-square was applied to the genital sensitivity analysis.

## Results

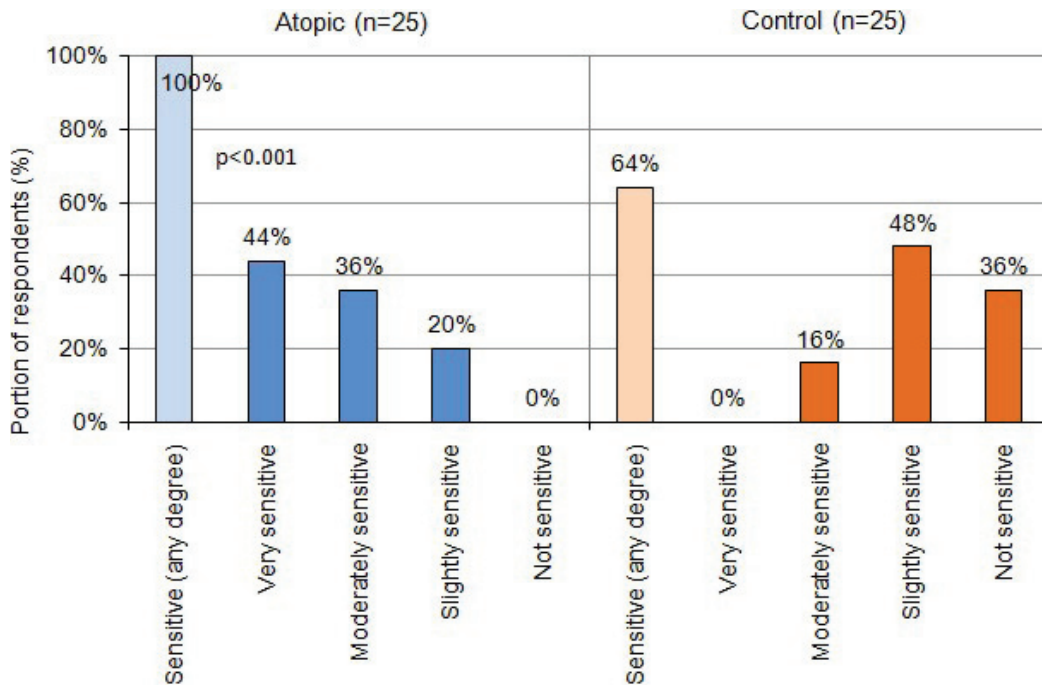
### Frequency and severity of self-diagnosed sensitive skin in patients with and without atopic dermatitis

A significant association was found between the clinical diagnosis of atopic dermatitis and the self-diagnosis of sensitive skin ( $p < 0.001$ ) (Fig. 1). All patients in the group with atopic dermatitis described their skin as sensitive to some degree, with 80% claiming their skin was either "very" or "moderately" sensitive (44% and 36%, respectively). The remaining 20% described their skin as "slightly" sensitive. By contrast, 64% of individuals in the control groups described their skin as sensitive to some degree, with only 16% claiming their skin was either "very" or "moderately" sensitive.

### Family and personal history and duration of self-diagnosed skin sensitivity

Patients with atopic dermatitis were significantly more likely to indicate a family history of sensitive skin (17 positive responses, or 68%) compared to controls (6 positive responses, or 24%) ( $p = 0.004$ , Table 1). Most atopic patients who claimed a family history of sensitive skin identified the parent as a relative with sensitive skin (13 of 17, or 76%). Of the 6 control patients who reported a family history of sensitive skin, 3 (50%) identified the relative with sensitive skin as their parent.

Patients with atopic dermatitis were significantly more likely to claim that their skin had been sensitive for "as long as they could remember", or "most of their adult life" (20 out of 25, or 80%, Fig. 2a) ( $p \leq 0.001$ ). By contrast, no one in the control group claimed their skin had been sensitive for as long as they could remember, and only 5 (20%) reported skin sensitivity for most of their adult life.



**Figure 1. Correlation of the frequency and severity self-diagnosed skin sensitivity with the presence of atopic dermatitis.** Responders were asked: "How would you describe your skin? (very sensitive, moderately sensitive, slightly sensitive, or not sensitive)". The frequency of responses for each possible description is plotted for the atopic and control groups. The percentage of responders who described their skin as sensitive to some degree were significantly greater for the atopic group compared to the control group ( $p < 0.0001$ , Fisher's exact test).

No significant difference was found between the groups with regard to perceived changes in the degree of skin sensitivity over time (Fig. 2b) ( $p = 0.3$ ). A large proportion of both groups indicated that their skin was currently either much more or a little more sensitive (14 in the atopic group and 10 in the control group).

### Environmental conditions, products and ingredients and reported to elicit skin reactions

Patients with atopic dermatitis were significantly more likely to report that rough fabrics, cold weather, stress and wind elicited skin irritation

(Table 2). These patients were also more likely to report perceived skin irritation to laundry products (but not dishwashing liquids or household cleaners), facial cleansers and personal cleansing bars or liquids, perfumes (but not fragranced products), alpha hydroxy acids and facial astringents, moisturizers and powders (but not foundation, other facial or eye cosmetics, or sunscreens), and hair products.

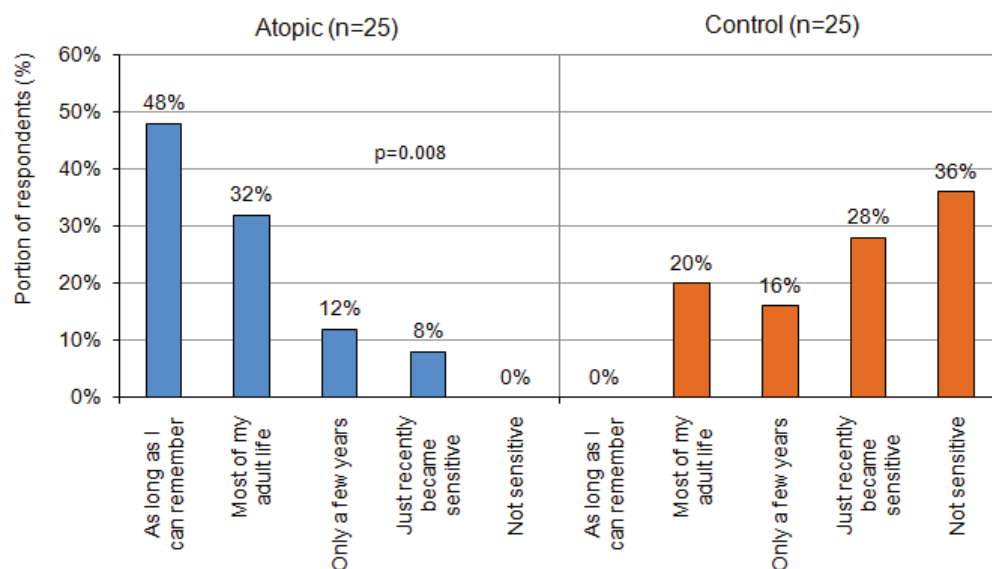
When shopping for skin care products, patients with atopic dermatitis were significantly more likely to look for claims such as "safe for sensitive skin" or "hypoallergenic" ( $p = 0.01$ ), and to avoid certain ingredients that they perceived might irritate the skin ( $p = 0.005$ ).

**Table 1. Responses to questions on family history.**

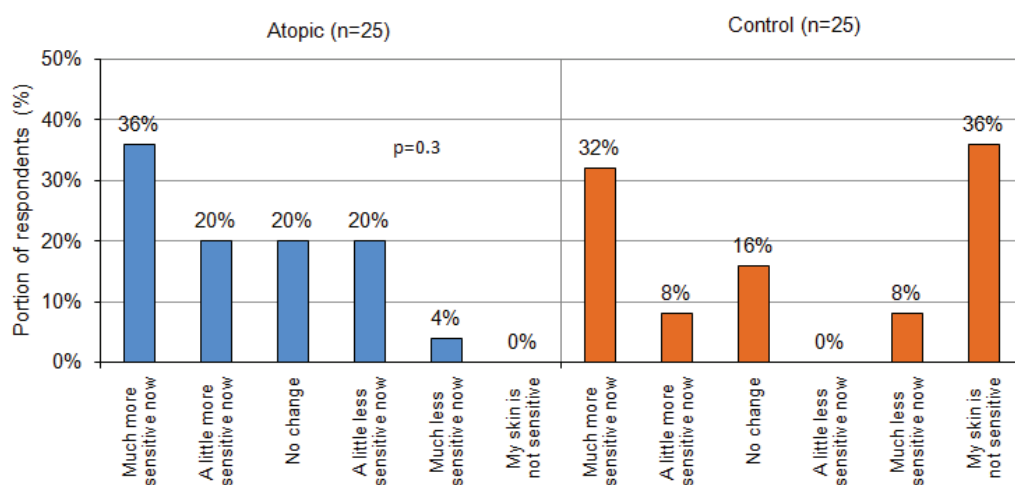
Group	Family history of sensitive skin			Relationship(among yes answers)			
	No	Yes		Parent	Parent and child	Child	Sibling
Atopic	8(32%)	17(68%)	$p = 0.004$	13(76%)	1(6%)	1(6%)	2(12%)
Control	19(76%)	6(24%)		3(50%)	0	1(17%)	2(33%)

Responders were asked: "Do any members of your family have sensitive skin? (yes/no)". Individuals in the atopic dermatitis group were significantly more likely to respond that there was a family history of sensitive skin compared to those in the control group ( $p = 0.004$ ). For those claiming a family history, the parent was the relative most likely to have sensitive skin. Spouses were not included as an option among family members with a history of sensitive skin.

## 2a. Duration of skin sensitivity



## 2b. Change of skin sensitivity over time

**Figure 2. Self-diagnosed skin sensitivity over time.**

(a) Responders were asked: "How long have you had sensitive skin? (as long as I can remember, most of my adult life, only a few years, just recently became sensitive)". The frequency of responses for each possible description is plotted for the atopic and control groups. There was a significant difference between the groups ( $p = 0.0008$ , Fisher's exact test).

(b) Responders were asked: "How has your skin sensitivity changed over the years? (much more sensitive now, little more sensitive now, no change, little less sensitive now, much less sensitive now)". The frequency of each possible response is plotted for the atopic and control groups. The two groups were not significantly different ( $p = 0.3$ , Fisher's exact test).

### Association of self-diagnosed genital skin sensitivity with atopic dermatitis

Patients with atopic dermatitis were significantly more likely to report genital sensitivity (as defined by burning, itching or redness) after contact with textiles such as acrylic fabrics ( $p = 0.01$ ) and hygiene pads ( $p = 0.05$ ), as shown in Figure 3a and 3b. Panty liners (Fig. 3c) were directionally but not significantly associated with genital sensitivity in this group ( $p = 0.6$ ). There was no significant

difference in the reaction to topical cleansers in the genital area between atopics and control subjects (Fig. 3d), nor to perfumes/fragrances ( $p = 0.6$ ) or deodorants/antiperspirants ( $p = 1.0$ ) (Fig. 3e and 3f, respectively).

### Association of atopy and perceived genital sensitivity

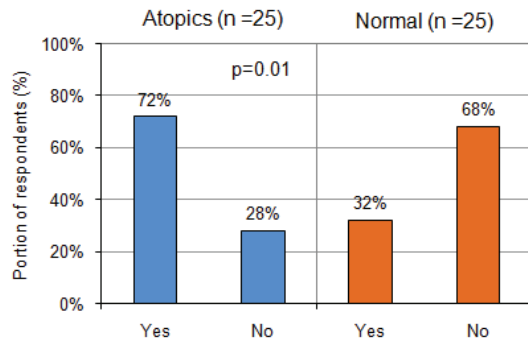
In addition to evaluating the individuals products and materials for differences in perceived genital

**Table 2.** Analysis of responses to questions on perceived sensitivity to various environmental factors, products and ingredients.

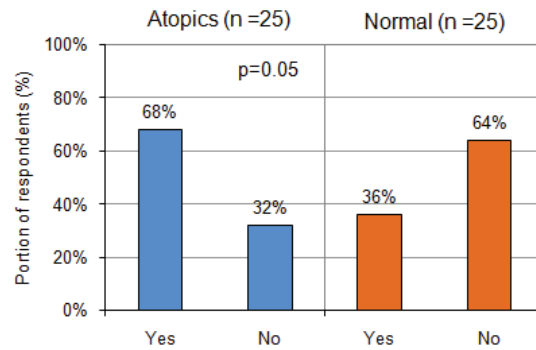
	Affirmative responses % (# positive responses/# of responders)		
	Atopic	Control	p-value
Environmental factors			
Which of the following factors cause your skin to become irritated? (frequently or sometimes vs. never)			
– rough fabric	87% (20/23)	26% (5/19)	0.0001
– cold weather	83% (20/24)	33% (7/21)	0.0009
– stress	82% (18/22)	43% (9/21)	0.01
– wind	55% (11/20)	15% (3/20)	0.02
– hot weather	47% (9/19)	20% (4/20)	0.1
– dry weather	55% (12/22)	28% (6/21)	0.1
– humid weather	28% (5/18)	16% (3/19)	0.4
– menses	32% (6/19)	19% (4/21)	0.5
Products and ingredients			
– Which of the following types of products have ever caused your skin to become irritated or uncomfortable? (frequently or sometimes vs. never)			
– laundry detergents, fabric softeners or dryer sheets	75% (16/20)	20% (3/15)	0.0006
– facial cleansers	71% (10/14)	8% (1/13)	0.001
– perfumes	50% (7/14)	0% (0/13)	0.006
– alpha hydroxy acids	82% (14/17)	27% (3/11)	0.006
– personal cleaning bars or liquids	92% (22/24)	57% (12/21)	0.01
– moisturizer	69% (11/16)	24% (4/17)	0.01
– shampoo or other hair products	50% (8/16)	12% (2/17)	0.02
– powders	50% (7/14)	9% (1/11)	0.04
– facial astringents	69% (9/13)	25% (3/12)	0.05
– fragranced products	25% (3/12)	0% (0/14)	0.08
– foundation or other facial cosmetics	36% (4/11)	8% (1/13)	0.1
– dishwashing liquids or household cleaners	75% (18/24)	53% (10/19)	0.2
– sunscreens	60% (9/15)	38% (6/16)	0.3
– eye cosmetics	60% (9/15)	47% (8/17)	0.5
– antiperspirants/deodorants	40% (6/15)	31% (5/16)	0.7
Shopping choices			
When shopping for skin care products, do you look for claims such as “safe for sensitive skin”, “hypoallergenic”, etc.? (yes/no)	88% (22/25)	52% (13/25)	0.01
Are there specific ingredients in skin care products that you avoid using because they irritate your skin? (yes/no)	40% (10/25)	4% (1/25)	0.005

A questionnaire was given to groups of 25 individuals that had been diagnosed with atopic dermatitis, and a group of 25 control individuals. Fisher's exact tests were performed to determine if the frequency of specific responses for the two groups were significantly different. For some questions, a portion of subjects did not respond to a question about specific materials or products, indicating they had no experience with that product. Those responses were excluded from the analysis.

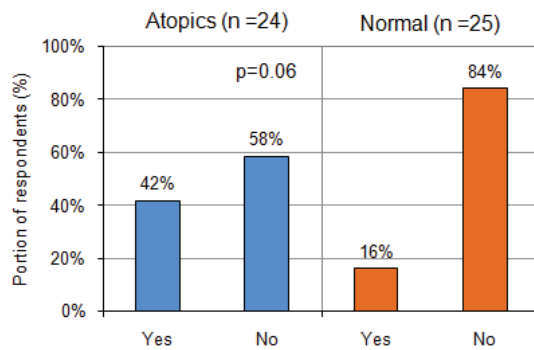
## 3a. Textile fabrics (acrylics)



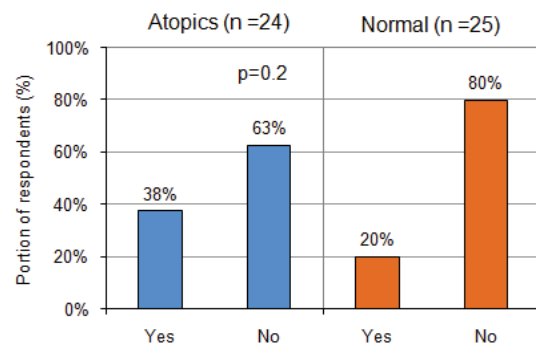
## 3b. Hygiene pads



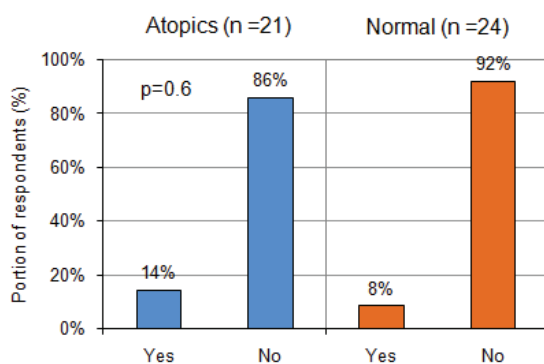
## 3c. Panty liners



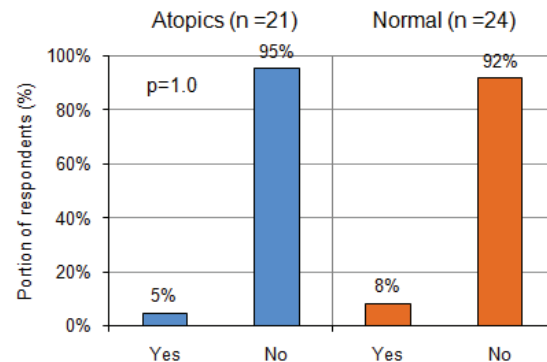
## 3d. Topical cleansers



## 3e. Perfumes / Fragrances



## 3f. Deodorants / antiperspirants



**Figure 3. Correlation between self-diagnosed genital skin sensitivity and the presence of atopic dermatitis.**

Responders were asked: "Do you have any sensitivity (burning, itching, erythema) on the genital area (yes/no) after use of six products and materials that would be expected to come into contact with the genital area. The frequency of reports of genital sensitivity in individuals with and without atopic dermatitis are shown. Significant differences between the atopic and control groups was determined using Fisher's exact test.

- (a) Textile fabrics (acrylics) ( $p = 0.01$ ).
- (b) Hygiene pads ( $p = 0.05$ ).
- (c) Panty liners ( $p = 0.06$ ).
- (d) Topical cleansers ( $p = 0.2$ ).
- (e) Perfumes/fragrances ( $p = 0.6$ ).
- (f) Deodorants/antiperspirants ( $p = 1.0$ ).

skin sensitivity between atopics and controls, the number of materials perceived to cause reactions was also evaluated. Atopics were more likely to perceive genital sensitivity to a significantly higher proportion of the six products specifically included in this question compared to the control group (Table 3). For atopics, an average of 41.4% of the products were perceived as causing genital irritation, compared to an average of 20.3% for the control group ( $p < 0.0001$ ).

## Discussion

This study demonstrated a significant association between clinically diagnosed atopic dermatitis and self-assessed sensitive skin. The frequency, severity and history of skin sensitivity in patients with atopic dermatitis were far more pronounced than in controls. All 25 patients with atopic dermatitis claimed to have sensitive skin, and most of these subjects (80%) perceived their skin as “very” or “moderately” sensitive (Fig. 1). In contrast, 64% of the control subjects perceived they have sensitive skin, with only 16% describing their skin as “moderately” sensitive.

Patients with atopic dermatitis were more likely to identify specific environmental factors or

products as eliciting skin irritation. Among environmental factors, rough fabrics, cold, stress and wind were singled out; topical products such as personal and facial cleansing products, moisturizers, alpha hydroxy acids and perfumes were also associated with skin reactions.

Interestingly, although perfumes were perceived by atopic patients to cause adverse skin effects, fragranced products were not. If patients with atopic dermatitis are indeed more sensitive to perfumes, perfumes may be more likely to elicit a reaction than fragranced products because perfumes are more concentrated and their amount applied is discretionary. By contrast, the levels of perfume in fragranced products are low and formulated to be well below threshold for skin irritation or skin sensitization. (10)

Our results also showed an association between atopic dermatitis and genital skin sensitivity. Patients with atopic dermatitis were more likely than controls to report genital symptoms after contact with hygiene pads (but not panty liners) and acrylic fabrics (Fig. 3). In addition, atopic individuals perceived genital sensitivity to a significantly higher proportion of the six products included in the questionnaire compared to the control subjects (41.4% versus 20.3%, as

**Table 3.** Responses to questions on perceived genital sensitivity after use of specific products.

# of “yes” responses/ # of total responses	Percentage of “yes” answers	Number of subjects with response pattern		Chi-square p value
		Atopic group (n = 25)	Control group (n = 25)	
6/6	100%	1	0	
4/4	100%	1	0	
3/3	100%	2	0	
5/6	83.3%	0	1	
3/4	75.0%	1	0	
4/6	66.7%	2	1	
3/6	50.0%	5	1	
2/4	50.0%	0	1	
2/6	33.3%	6	2	
1/6	16.7%	4	12	
0/6	0.0%	3	7	
Average percentage of “yes” answers		41.4%	20.3%	$p < 0.0001$

As part of the questionnaire, panelists were asked if they experienced any sensitivity (burning, itching, erythema) on the genital area after use of six specific products: textiles (acrylic fabrics), hygiene pads, panty liners, topical cleansers, perfumes/fragrances, deodorants/antiperspirants. Not all panelists gave yes/no responses for all 6 products (shaded areas), therefore, the average percentage of “yes” answers was determined for both the atopic and control groups. (Note that two individuals in the atopic group, and one in the control group, provided answers for only 4 of the 6 products, and two individuals in the atopic group provided answers for only 3 products)

shown in Table 3). To our knowledge, this is the first time that atopic dermatitis has been associated specifically with self-assessed genital skin sensitivity.

Interestingly, patients with atopic dermatitis associated “personal cleansing bars and liquids” with sensitive skin in general (Table 2), but did not associate “topical cleansers” with sensitive genital skin in particular (Fig. 3). This may reflect a true difference in sensitivity between vulvar skin and skin at other sites. Differences in skin irritation between vulvar skin and exposed skin have been observed with a variety of agents (reviewed in 11). Alternatively, the wording of the questions may have influenced the response.

The fact that atopic patients reported genital symptoms to pads but not panty liners was unexpected. However, this finding is consistent with an earlier study using individuals who participated in a clinical trial of hygiene pads. (12) In this study, most of the individuals who perceived that they had sensitive facial skin reported sensitivity of the genital area after use of hygiene pads and acrylic fabrics. It is possible that, in both the earlier study and the current one, a larger sample size may have uncovered a relationship with panty liner use as well. Another possibility is that the discomfort associated with hygiene pads in atopic patients may be specific to menstrual use (for example, due to an exacerbation of skin irritation in the presence of menses fluid). However, these patients were not more likely to associate overall skin sensitivity with menstruation; moreover, we have found that the vulva is relatively insensitive to menses-induced irritation, at least in women with normal skin. (13) Alternatively, atopic patients who are bothered by hygiene pads may avoid panty liner use and, therefore, not experience symptoms to this category of products. The fact that atopic patients were also more likely to search for hypoallergenic products and skin safety claims support the possibility that atopics modify shopping habits and behaviors to avoid products perceived to cause skin problems.

In conclusion, we found an association between clinically diagnosed atopic dermatitis and self-diagnosed sensitive skin. All 25 atopic patients in the study perceived their skin to be sensitive, longstanding and moderate to severe. Personal cleansing, skin care products, laundry products

were reported to elicit skin reactions by this patient population. Atopy was also associated with genital sensitivity to hygiene pads and rough fabrics. Atopic patients were more likely to seek products formulated for sensitive skin. Understanding the nature of self-diagnosed sensitive skin will allow manufacturers to develop products to better meet the needs of this population.

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## Disclosure

The authors report no conflicts of interest.

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