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Gender-Related Characterization of Sensitive Skin in Normal Young Chinese

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Abstract

Background.—While clinical signs, symptoms, as well as etiology of sensitive skin in general populations have been extensively studied over the last decades, characteristics of sensitive skin in normal subjects, particularly gender-related characteristics, still remain unknown.

Objective: In the present study, we characterize facial sensitive skin in normal young Chinese.

Subjects and Methods.—A questionnaire was given to each participant aged 10 to 30 years. Clinical signs, symptoms, and associated trigger factors of facial sensitive skin were compared in normal young Chinese males versus females.

Results.—After excluding subjects with pre-existing skin disorders, 475 females and 429 males out of 954 responders were included in the analyses. Prevalence of self-reported facial sensitive skin was significantly higher in females than in males. Yet, while more females experienced various symptoms, symptoms were more severe in males than in females. However, both the prevalence and severity of clinical signs were similar in females and males. Skin care products appeared to be the major contributors to facial sensitive skin in both genders. Moreover, it appeared that females were more sensitive to environmental factors such as low humidity and sun exposure while males were more sensitive to emotional factors. Taken together, these results demonstrate that characteristics of sensitive skin are associated with gender, while the underlying mechanisms remain to be explored.

Conclusions.—There are gender differences in prevalence, symptoms and trigger factors of facial sensitive skin in normal young Chinese.

Keywords

Skin care products; Sensitive skin; Gender; Prevalence

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Introduction

In recent decades much attention has been paid to sensitive skin because of its high prevalence and substantial impact on the quality of patients' live[1–3]. The principal characteristics of sensitive skin have been assessed in general population. Previous studies showed that the prevalence of sensitive skin varies greatly with country[3–10]. Ethnic variation in the prevalence of self-perceived sensitive skin was also identified in the 45 to 54-year old group[11]. Studies have also shown that even in the same ethnic groups, the prevalence of sensitive skin varies with geographic regions[5]. Although gender differences in the prevalence of sensitive skin has been recognized (supplemental Table 1)[11], but not in all ethnic groups. For example, higher prevalence of sensitive skin was observed in females than in males in China[5], but not in Japan and US[6, 12]. Likewise, prevalence of sensitive skin varies with body sites[12]. Regarding the influence of age on prevalence of sensitive skin, the results are also mixed[1, 10].

In respect of influencing factors of sensitive skin in general population, certain skin disorders, such as atopic dermatitis, psoriasis and rosacea, are on the top list of contributors to sensitive skin[13]. In Brazil, 31% of subjects with sensitive skin have skin disorders, while 37% are sensitive to warm climatic condition[4]. In US, over 80% subjects are sensitive to weather condition[3]. But in China, emotional stimulation is the major trigger of hot flashes while cosmetic products are the major cause of tingling[5]. In Russia, over 50% of subjects with sensitive skin are sensitive to either windy or cold condition or temperature shift[4]. Moreover, sensitivity to trigger factors also differs between genders. In comparison to males, females are more sensitive to rubbing the skin such as washing clothing and cloths, and to facial moisturizers/lotions[12]. All these data are much helpful to understand features and to manage sensitive skin in general population. However, all data above were collected using questionnaires from general population, and they may not reflect actual situations in some cases. For example, different age groups and different gender can differentially expose to different working or living environment, likely influencing the development of symptoms and signs of sensitive skin. Thus, gender and age differences in the prevalence of sensitive skin could be environmental differences. Moreover, severity of symptoms and signs has not been characterized in males and females. Here, we characterize the facial sensitive skin in normal, skin-disease-free, young Chinese students in Guanzhou city.

Participants and Methods

Study Subjects:

A questionnaire was distributed to each participant at local schools of Guangzhou City between April and May, 2018 (modified from ref.14. Supplemental table 2). Subjects used questionnaire to subjectively proclaim their skin as very sensitive, sensitive, slightly sensitive, or not sensitive at all. Skin types such as dry, oily, mixed skin were self-declared by participants, too[1,14]. In addition, participants also scored severities of symptoms and signs of sensitive skin using sensitive scale-10[14]. All participants were students aged 13 to 30 years, without any known skin disorders. A dermatologist further confirmed any skin disorders claimed on the questionnaire. Data from subjects with either skin disorders or self-perceived sensitive skin on the sites other than the face were excluded from analyses.

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Investigators had a full discussion of this study with the participants, including their right, and the participants gave their informed consent verbally.

Statistics:

GraphPad Prism 5 software was used for all statistical analyses. Fisher's exact test, two-tailed Chi-square test and unpaired t test were used to determine significances. Data are expressed as mean ± SEM.

Results

Seventy eight percent (954/1218) of subjects returned questionnaires. Fifty participants were excluded because of the presence of skin disorders. Thus, data from 904 participants, including 429 males and 475 females, were included in the analyses (detailed in Table 1). Majority of these participants were college students (892/904, 99%). More females than males were dry and oily mixed type of skin (58% vs. 38%, $p<0.0001$). In contrast, more males than females were oily skin (38% vs. 21%, $p<0.0001$). Subjects with a history of adverse cutaneous reactions to skin care products accounted for 13% and 6%, respectively, in females and males (Table 1).

We first analyzed the prevalence of facial sensitive skin in males and females in this cohort. Among the 904 subjects, 86 males (20%) and 142 females (30%) proclaimed sensitive skin. Overall prevalence of sensitive skin in this cohort was 25% (228/904). Overall prevalence of facial sensitive skin in females was markedly higher than that in males although the percentages of very sensitive and sensitive skin were comparable in males versus females (Table 2).

To characterize the features of facial sensitive skin in these normal young Chinese, we first compared the symptoms between males and females. As seen in Fig 1a, more females than males experienced tingling and tautness. In contrast, most of symptoms in males were more severe than that in females (Fig. 1b). However, neither the prevalence nor the severity of cutaneous signs differed between males and females (Fig. 2). These results demonstrate that both the prevalence and symptoms of facial sensitive skin vary with gender in normal young Chinese.

Triggering Factors of Facial Sensitive Skin Differ between Males and Females

We next compared the common triggering factors of facial sensitive skin in females versus males. In this cohort, 24% (115/475) of females and 10% (46/429) males routinely used other skin care products in addition to cleansers ($p<0.0001$, females versus males). Moreover, more females (19%, 88/475) than males (4%, 19/429) used multiple types of skin care products ($p<0.0001$, females versus males). Skin care products were the number one trigger factors of facial sensitive skin in both males and females. More females than males proclaimed skin care products as triggering factors of facial sensitive skin (Table 3. 47% vs. 30%, $p=0.0126$). Likewise, more females than males proclaimed sun-exposure and low humidity as trigger factors of facial sensitive skin (Table 3. females vs. males, $p=0.0234$ for sun-exposure; $p=0.0026$ for low humidity). In contrast, emotion was the second triggering

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factor to skin care products in males (Table 3). Taken together, these results suggest that gender determines the responses of the face to certain external stimuli.

Discussion

Although the prevalence of sensitive skin in general populations has been well studied, data from skin-disease-free, normal humans are not available yet. We show here that prevalence of facial sensitive skin is 25% in normal young Chinese, which is higher than that in general Chinese of comparable age group[5]. These discrepant results could reflect the differences in study seasons, which are known triggering factors of sensitive skin[15]. Our study was performed between April and May while the other study was carried between November and January when the humidity and temperature are lower than that in April and May (Supplemental Table 3). Moreover, participants in the present study were students, who presumably exposed to similar living environment while the participants in other study were general populations who exposed to various living and working environments. Thus, coupling these discrepant results with the influencing factors of sensitive skin, cautions should be taken when comparing the prevalence of sensitive skin among different studies.

Regarding the gender differences in the prevalence of sensitive skin in general populations, prevalence is generally higher in females than in males except in Russia where males have a higher prevalence than females (Supplemental Table 1). The present study also demonstrates that in normal young Chinese, prevalence of facial sensitive skin was higher in females than in males. It is worth noting that most of prior studies, if not all studies, were carried in general populations. Those participants exposed to a wide range of different environments or working conditions, potentially influencing skin conditions and psychological status, possibly leading to alterations in skin sensitivity to stimuli. In general, males and females differentially expose to different environments because of occupation and/or physical activity. The link between environmental factors and sensitive skin has been well demonstrated[16]. Thus, gender differences in the prevalence of sensitive skin may not reflect true gender differences in prior studies, instead environmental or other differences. In contrast, participants in the present study were skin-disease-free students living in the same city. Theoretically, both males and females exposed to the same or similar environments. Therefore, it is likely that gender differences in prevalence of sensitive skin presented here may truly reflect gender differences in psychological and physiological conditions, and/or life style as discussed below.

Though studies show that some dermatoses such as atopic dermatitis and psoriasis are associated with sensitive skin[5,7,9], proportions of subjects with sensitive skin and non-sensitive skin were not different among subjects with dermatoses[10]. In contrast, it is widely accepted that skin care products are strongly associated with sensitive skin in general populations[3, 9]. Correspondingly, we show here that skin care products were the number one factor associated with sensitive skin on the face of normal young Chinese. This finding parallels with recently observations that skin care products increasingly cause adverse cutaneous reactions[17,18]. That more females than males proclaimed skin care products as triggering factors is likely linked to a higher prevalence of adverse cutaneous reactions to skin care products in females (Table 1), possibly due to that more females than males used

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skin care products (24% versus 10%). In particular, more females used multiple types of skin care products in comparison with males (19% versus 4%), making the skin more vulnerable to the development of sensitive skin. Of course, gender differences in personal hygiene habits can also contribute to the higher prevalence of sensitive skin in females, because generally females wash their faces more thoroughly in comparison with males, potentially leading to disruption of epidermal permeability barrier, resulting in increasing skin sensitive. Moreover, the thickness of stratum corneum, a crucial protective layer of the skin, is thinner in females than in males[19], possibly leading to an increased permeability, consequently making the skin more susceptible to irritants or allergens. The differences in stratum corneum thickness may also be attributed to the differences in sensitivity to low humidity between males and females. Another interesting finding in the present study is that symptoms in males was more severe than that in females. The underlying mechanisms are unknown. It is possible that females use moisturizers more frequently than males because moisturizers can alleviate some cutaneous symptoms such as pruritus and dryness[20]. Nevertheless, the present study clearly demonstrates that both prevalence and severity of symptoms of facial sensitive skin are gender dependent in skin-disease-free young Chinese.

In summary, the present study demonstrates that the prevalence of facial sensitive skin is high in skin-disease-free young Chinese, and that the prevalence, triggering factors and severity of symptoms of facial sensitive skin vary with gender. Skin care products are the major factor associated with sensitive skin in skin-disease-free normal young Chinese, raising further concern of the safety of skin care products. However, this study was done only in young Chinese. The characteristics of sensitive skin in other age groups of skin-disease-free population remain to be explored.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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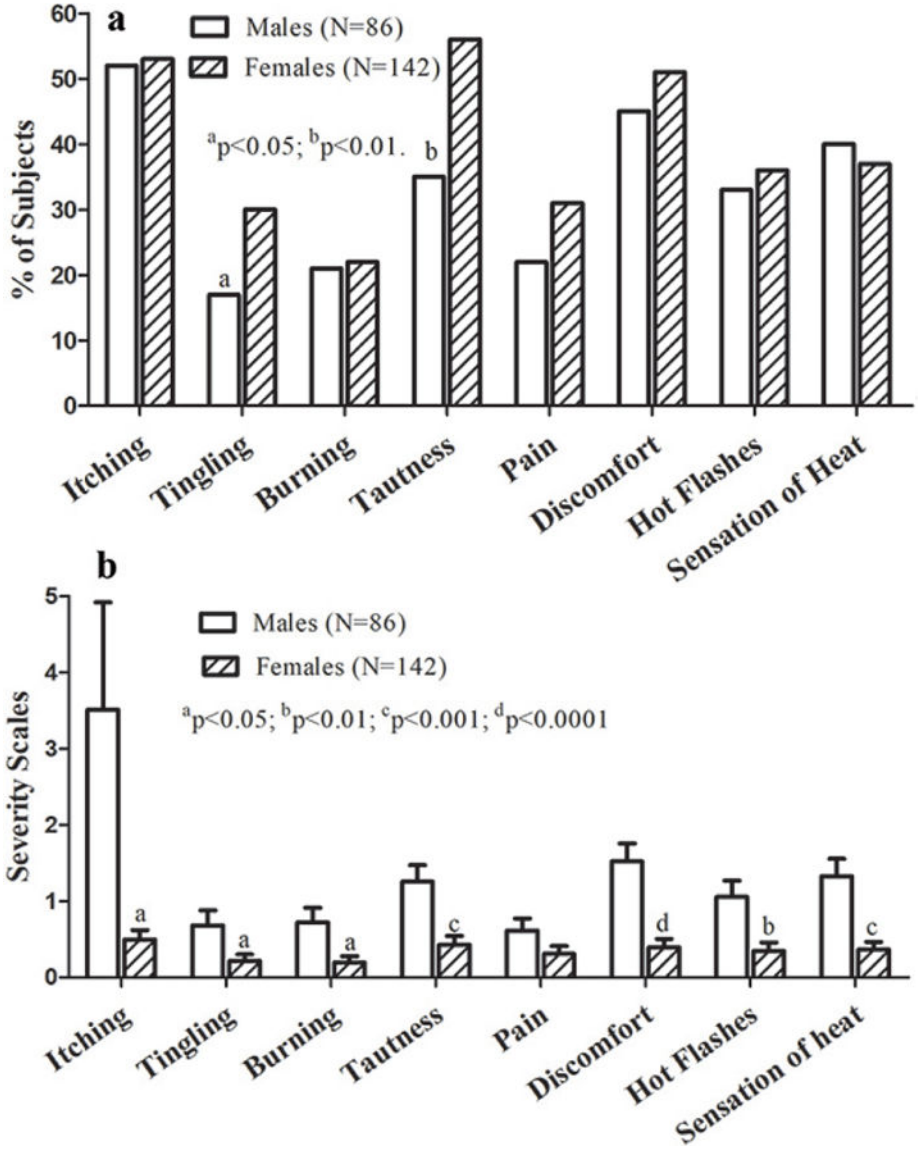

Figure 1. Comparison of Clinical Symptoms between Males and Females.

Fig. 1a. Prevalence of symptoms. Fisher's exact test was used to determine significances. Fig. 1b. Severity of symptoms. Unpaired t test with Welch's correction was used to determine significances. Data are expressed as mean ± SEM. Number of subjects in each group is detailed in the Table 1 and on the Figures.

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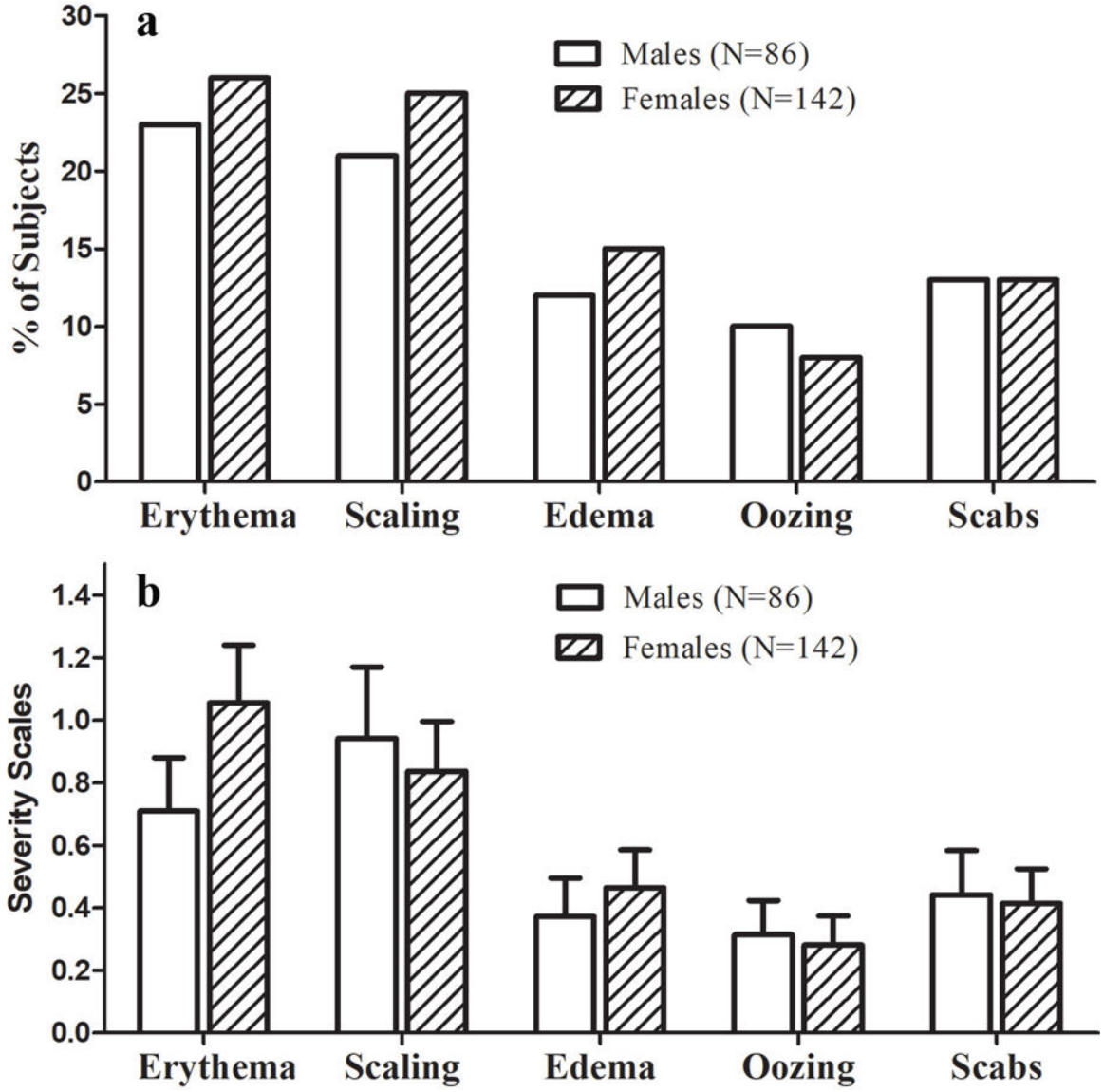

Figure 2. Comparison of Clinical Signs between Males and Females.

Fig. 2a. Prevalence of signs. Fisher's exact test was used to determine significances. Fig. 2b. Severity of signs. Unpaired t test with Welch's correction was used to determine significances. Data are expressed as mean ± SEM. Number of subjects in each group is detailed in the Table 1 and on the Figures.

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Table 1.

Demographic Characteristics of Subjects

	Females (N=475) [N (%)]	Males (N=429) [N (%)]	Significances
Age			
Minimum	13.00	16.00	
25% Percentile	19.00	19.00	
Median	19.00	19.00	
75% Percentile	20.00	20.00	
Maximum	23.00	30.00	
Mean ± SEM	19.40±0.07	19.38±0.06	NS
Family history of sensitive skin	51(11%)	31(7%)	NS
Skin Types			
Dry	64(13%)	67(16%)	NS
Oily	100(21%)	161(38%)	$P<0.0001$
Dry and oily mixed	278(58%)	161(38%)	$P<0.0001$
Undefined	33(7%)	40 (9%)	NS
A history of adverse cutaneous reactions to skin care products	61 (13%)	24 (6%)	$P=0.0002$

Fisher's exact test was used to determine the significant differences between males and females.

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Table 2.

Comparison of Prevalence of Sensitive Skin in Males vs. Females

Gender	Sensitive Skin [N (%)]			
	Very sensitive	Fairly sensitive	Slightly sensitive	Total
Males (N=429)	3(1%)	14(3%)	69(16%)	86 (20%)
Females (N=475)	5(1%)	26(5%)	111(23%)	142 (30%)
P Values Males vs. Females	NS	NS	P=0.0075	p=0.0007

Fisher's exact test was used to determine the significances between males and females.

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Table 3.

Triggering Factors

Triggering Factors	Females (N=142)	Males (N=86)	*P* Values
Skin Care Products	67(47%)	26(30%)	0.0126
Environment			
Cold	9(6%)	7(8%)	NS
Heat	24(17%)	14(16%)	NS
Sun	49(35%)	15(17%)	0.0234
Wind	7(5%)	4(5%)	NS
Low humidity	52(37%)	15(17%)	0.0026
High humidity	18(13%)	8(9%)	NS
Air conditioner	2(1%)	0	NS
Pollen	17(12%)	9(10%)	NS
Air pollution	39(27%)	18(21%)	NS
Emotion			
Exciting	23(16%)	18(21%)	NS
Anxiety	24(17%)	19(22%)	NS
Angry	24(17%)	18((21%)	NS

Fisher's exact test was used to determine the significances