

Ethnic variations in self-perceived sensitive skin: epidemiological survey

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To examine possible ethnic variations in perception of sensitive skin, an epidemiological survey was performed in the San Francisco area. Approximately 800 telephone interviews were conducted with women from four different ethnic groups (Afro-Americans, Asians, Euro-Americans, Hispanics; approximately 200 women per group). In addition to sensitive facial skin assessments, age and other general skin condition data were collected. 52% of the subjects identified themselves as having sensitive facial skin. There was no statistical difference between the ethnic groups in terms of sensitive skin prevalence. Nevertheless, some differences were noted between ethnic subgroups of sensitive skin. Euro-Americans were characterized by a higher skin reactivity to wind and tended to be less reactive to cosmetics. Afro-Americans presented diminished skin reactivity to most environmental factors and a lower frequency of recurring facial redness. Asians appeared to have greater skin reactivity to spicy food, to sudden changes in temperature and to wind, and tended to suffer from itching more frequently. Hispanics presented a lower incidence of skin reactivity to alcohol. The differences in skin sensitivity between ethnic groups concerned mostly factors of skin reactivity and, to a lesser extent, its symptomatology. But, taken together, we note the similarities in comparing how women of varying ethnic backgrounds perceive the sensitive skin condition.

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In broad terms, sensitive skin is largely agreed to be a lay term used by individuals who consider themselves more intolerant to applied products and environmental factors than the general population. The more frequent symptoms, such as stinging, burning and itching sensations on the face, are subjective (1, 2), with or without any clinical visual signs of irritation. This complex entity is encountered in all industrialized countries and thus concerns populations from many ethnic backgrounds (3).

Studies that have examined a possible influence of ethnic background on structural, biomechanical and physiological properties of the normal skin have focused primarily on differences between black and white skin but, in the past 30 years, have also considered Asian and Hispanic skin types. For instance, compared with Euro-Americans, Afro-Americans are reported to have an increased number of stratum corneum layers, a greater resistance to tape stripping (4), an increased lipid content (5, 6) and a more elastic skin on sun-exposed sites (7). More recently, due to global marketing in the cos-

metic industry, assessment of ethnic differences in skin reactivity has become more important (8) and has started with conflicting findings concerning some aspects of irritation and sensitization (9).

Ethnic variations in subjective irritation has not been as well explored as irritant or allergic contact dermatitis. Thus, we conducted an epidemiological study on sensitive skin condition in San Francisco. Approximately 800 women from 4 different ethnic backgrounds (Afro-American, Asian, Euro-American, Hispanic) were interviewed.

Subjects and Methods

Survey

In December 1998, we conducted 811 phone interviews with women in the San Francisco area concerning sensitive skin. In view of the large variety of migrant populations in California, we considered the San Francisco area an ideal choice for such a study. To achieve sufficient numbers of women from each ethnic group, we utilized four ethnicity-specific lists and calls were directed to

geographical areas with high incidence of ethnic-specific residences. After a brief presentation of the project, women were asked to define and/or confirm their ethnic background, their age and the address of their main home. To be selected for the survey, women had to give verbal consent, be 18–54 years old, live, at most, 20 miles from University of California San Francisco Medical Center, and have one of the following ethnic backgrounds: Afro-American, Asian, Euro-American or Hispanic. 16 interviewers completed the interviews (4 interviewers of the same ethnic background as the ethnic group they interviewed, multiplied by four ethnic groups). English was the general language used for the interviews but Hispanic subjects had the possibility to choose Spanish.

Sensitive skin questionnaire

The questionnaire was derived from a questionnaire previously used for a mail epidemiological survey in UK (10). For the present study, it has been completed with seven environmental factors of skin reactivity, detailed below. The questionnaire was specially customized for the purpose of a phone survey. It contained 30 items and was designed to provide accurate information about sensitive skin status (existence or not, symptomatology, factors of skin reactivity). Subjects defined whether they considered themselves to have a sensitive facial skin. They were questioned also about the recurrence of facial burning, stinging or itching sensation and redness. Factors of skin reactivity included: frequent problems (discomfort or rash) at the time of use of new cosmetics, environment (wind, cold, warm, sun, sudden changes in temperature, changes in weather, air pollution), foods (spicy food, alcoholic beverages) and others (emotion or stress, menstrual cycle). In addition, information on age, other general skin condition data (eczematous diathesis, acne, skin type – normal, oily, dry), asthma or hayfever was collected. Concerning eczematous diathesis (current or past eczema), in order to minimize the possible confusion with other skin disorders made by the subjects, they were asked in their responses to refer themselves to a diagnosis previously performed by a physician.

Statistical methods

We first compared the prevalence of sensitive skin in each ethnic group and then attempted to detect differences concerning other criteria between ethnic subpopulations that fell within the group 'sensitive skin'.

The incidence of women who considered them-

selves to have a sensitive facial skin was compared for each ethnic group with the prevalence in the overall population. The criterion (Value-test) used was derived from a hypergeometric distribution and was expressed by number of standard deviations of a standard Gaussian distribution (11). At the 5% level, for any one variable, a group is considered as differing from the overall population if the absolute value of its associated Value-test for this specific variable is over 1.96 (nonadjusted). To detect any particular feature of sensitive skin perception by ethnicity, this test was also used to identify the variables statistically overexpressed or underexpressed in each ethnic sensitive skin subgroup compared to the entire sensitive skin subpopulation. For that, we performed an automatic characterization of the variable: 'sensitive skin'. The range of Value-tests permitted a rapid sort, by order of importance, of the discriminant variables between groups.

Statistical analysis was carried out using SPAD (Version 4.00; CISIA, Montreuil, France) and SPSS (Version 8.00; SPSS Inc., Chicago, IL, USA) software.

Results

In order to complete the total of 811 interviews, 8509 telephone calls were made. The 7698 unsuccessful calls can be categorized as follows: 6688 refused interviews, 763 interviewees had hearing or language difficulties and 247 respondents were disqualified by not passing the survey screening questions. Among these 811 women, 210 had an Euro-American, 201 an Afro-American, 200 an Asian and the remaining 200 a Hispanic background. One quarter of the interviews of Hispanics were conducted in Spanish at the subject's request.

Description of the population

Table 1 presents the results for age, general skin condition data and asthma or hayfever status concerning the whole population and each ethnic group separately.

Age

Considered as a whole, 70% of the study sample were between 35 and 54 years old and 30% between 18 and 34. The distribution of ages was not strictly homogeneous for the different groups. For instance, Asian women were generally younger and Afro-Americans older. This was particularly true for the modality 45–54 years of age; 29.5% of Asians and 45.8% of Afro-Americans fell within this category.

Table 1. Description of the four ethnic groups and the overall population regarding age, skin type, acne, eczematous diathesis and asthma or hayfever in terms of incidence. The statistically significant differences in comparison with the overall population are shown in bold characters

		Afro-Americans (n = 201)	Asians (n = 200)	Euro-Americans (n = 210)	Hispanics (n = 200)	Overall population (n = 811)
Class of age	18–24	6%	14%	7%	14%	10%
	35–34	16%	23%	18%	22%	20%
	35–44	32%	34%	31%	33%	32%
	45–54	46% ($p < 0.04$)	29% ($p < 0.04$)	44%	31%	38%
Skin type	Fairly normal	34%	29%	37%	32%	33%
	Fairly or strongly dry	43%	45%	37%	44%	42%
	Fairly or strongly oily	21%	27%	25%	24%	24%
Acne or pimple breakouts on a regular basis		26%	35%	34%	30%	31%
Eczematous diathesis	Current eczema	15%	14%	9%	6% ($p < 0.04$)	11%
	Eczema during childhood	17%	16%	9%	8%	13%
Asthma or hayfever		22%	19%	14%	18%	18%

Table 2. Automatic characterization of ethnicity in sensitive skin population. All the modalities of other questionnaire variables which were significantly overexpressed or underexpressed in each ethnic subgroup of sensitive skin are listed below. For each ethnic group, the characteristic modalities are arranged in descending order of statistical significance, as determined by Value-test and they are associated with their respective frequency in the related group and in the overall sensitive skin population. If Value-test, is positive (or, respectively, negative), the characteristic modality is overexpressed (or, respectively, underexpressed) in the ethnic subgroup in comparison with the overall sensitive skin population

Ethnic subgroup of sensitive skin	Variable	Characteristic modality	% in the subgroup	% in sensitive skin population (n = 420)	Value-test
Afro-American (n = 106)	Facial skin easily irritated by wind	Disagree	55.7	37.4	4.33
	Facial skin easily irritated by cold weather	Disagree	54.7	39.8	3.50
	Recurrent redness on facial skin	Disagree	70.8	58.3	2.92
	Facial skin irritated by fast changes in temperature	Disagree	63.2	52.1	2.54
	Facial skin easily irritated by air pollution	Disagree	53.8	42.9	2.50
	Facial skin easily irritated by sun	Disagree	41.5	31.7	2.37
	Facial skin easily irritated by alcoholic beverages	Agree	16.0	24.1	– 2.15
	Easily irritated facial skin	Agree	83.0	75.5	2.00
Asian (n = 101)	Facial skin easily irritated by spicy foods	Agree	31.7	22.1	2.46
	Facial skin easily irritated by wind	Agree	72.3	61.7	2.43
	Facial skin irritated by fast changes in temperature	Agree	57.4	46.9	2.32
	Facial skin easily irritated by alcoholic beverages	Agree	32.7	24.1	2.16
	Recurrent itching sensation on facial skin	Agree	42.6	33.8	2.00
Euro-American (n = 106)	Facial skin easily irritated by wind	Agree	74.5	61.7	3.09
	Avoid certain cosmetics due to induced discomfort	Agree	70.8	78.3	– 2.02
Hispanic (n = 107)	Facial skin easily irritated by alcoholic beverages	Disagree	74.8	63.1	2.83

Skin condition and asthma or hayfever status

Approximately one third of the questioned women considered themselves to have normal skin, one quarter oily skin and 40% dry skin. Approximately 30% suffered from recurrent acne or pimple breakouts. The self-reported incidence for current eczema or dermatitis was 11%, 13% for eczema or dermatitis during childhood and 18% for asthma or hayfever.

The only statistically significant difference con-

cerned incidence of current eczema, which was less frequent in the Hispanic population (6%) than in the population as a whole (11%). Even though the differences did not reach statistical significance, we observed that the incidence for past and current eczema was higher in the Afro-American group. These results concerning eczematous diathesis fitted in with those relating to asthma or hayfever, with a higher incidence in Afro-Americans, suggesting that the Afro-American group was more atopic. We did not find any statistically significant

Table 3. Environmental factors of skin reactivity. Frequency with which each ethnic sensitive skin subpopulation and the overall sensitive skin population agreed with the statements concerning skin reactivity to environmental factors. Statistically significant differences vs the overall sensitive skin population are shown in bold characters

	Sensitive skin Afro - Americans (<i>n</i> = 106)	Sensitive skin Asians (<i>n</i> = 101)	Sensitive skin Euro - Americans (<i>n</i> = 106)	Sensitive skin Hispanics (<i>n</i> = 107)	Overall sensitive skin population (<i>n</i> = 420)
Wind	42.4% (<i>p</i> < 0.001)	72.3% (<i>p</i> < 0.010)	74.5% (<i>p</i> < 0.002)	57.9%	61.7%
Fast changes in temperature	34.9% (<i>p</i> < 0.005)	57.4% (<i>p</i> < 0.015)	57.4%	51.4%	46.9%
Air pollution	41.5%	58.4%	46.2%	54.2%	50.0%
Cold weather	45.3% (<i>p</i> < 0.001)	65.3%	64.1%	63.5%	59.5%
Changes in weather	44.3%	56.4%	47.2%	57.9%	51.4%
Warm weather	36.8%	36.6%	37.8%	44.9%	39.0%
Sun	58.5% (<i>p</i> < 0.020)	67.3%	71.7%	72.9%	67.6%

difference for any of the groups concerning skin type and recurrence of acne or pimple breakouts compared to the entire population.

Prevalence of self-reported sensitive skin

Subjects were asked whether they 'strongly agree', 'somewhat agree', 'somewhat disagree' or 'strongly disagree' with the sentence: 'I have a sensitive facial skin'. Figure 1 presents the results for each ethnic group and the whole population in terms of frequencies for the 'agreement' modalities. In the modality 'net agree', note that 52% (*n* = 420) of the questioned women considered themselves to have sensitive facial skin. There was no statistically significant difference between the four ethnic groups concerning this frequency. The distribution between 'strongly agree' and 'somewhat agree' ap-

peared to be slightly different for Afro-Americans compared to the whole population and especially compared to Asians and Euro-Americans. Thirty-six percent of Afro-American women, 31% of the entire population, 28% of Asians and 27% of Euro-Americans responded 'strongly agree'. Nevertheless, the difference between Afro-American women and the whole population was not statistically significant.

Characterization of ethnicity in sensitive skin population

There was no statistical difference between the ethnic groups in terms of sensitive skin prevalence. To ascertain whether these groups differed in symptomatology or in factors of skin reactivity, we performed an automatic characterization of the vari-

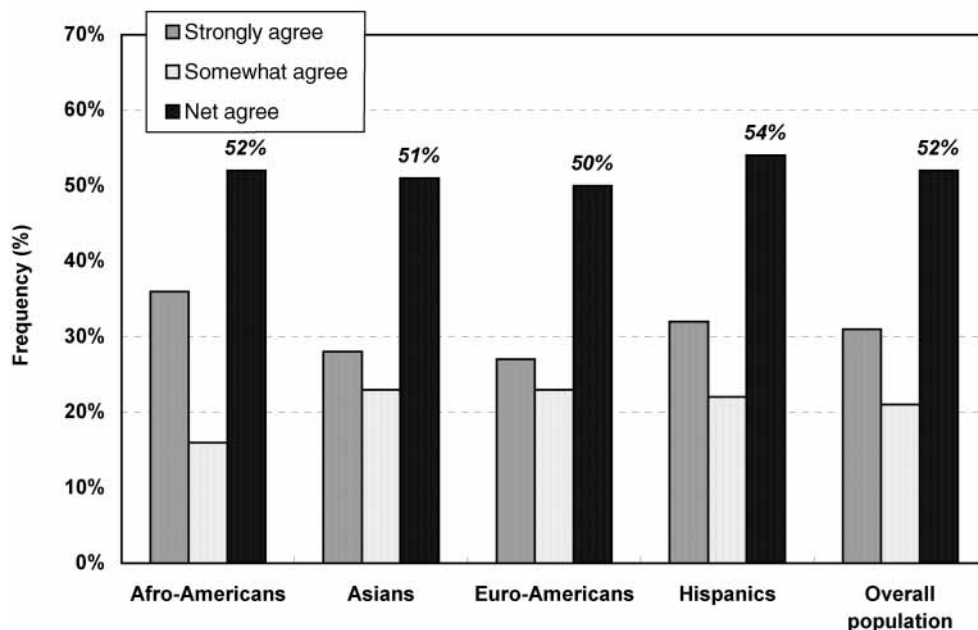


Fig. 1. Histograms showing the frequency with which each ethnic population and the overall population 'strongly' or 'somewhat' agreed with the statement: 'I have sensitive facial skin' and the frequency of 'net agree', which is the sum of both modalities cited above.

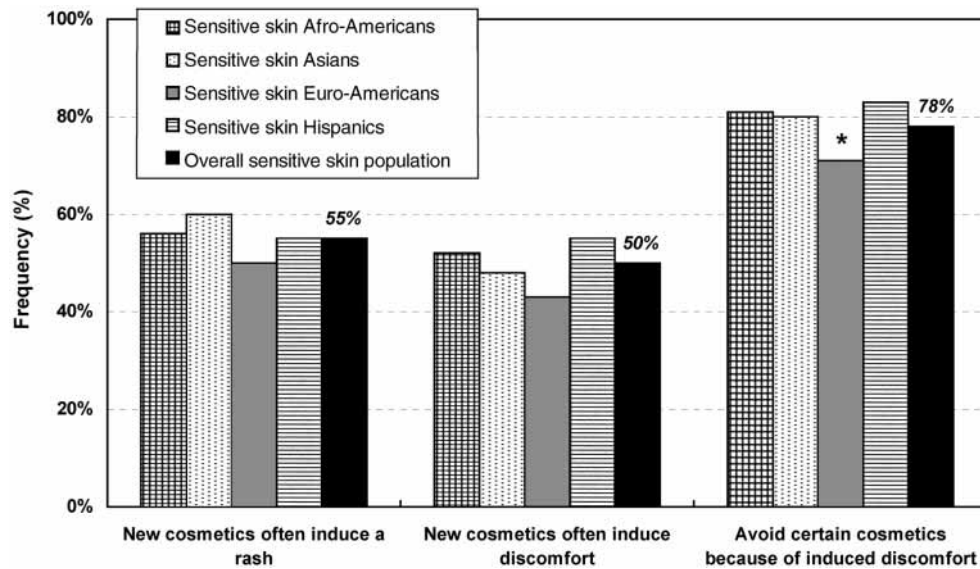


Fig. 2. Histograms showing the frequency with which each ethnic sensitive skin subpopulation and the whole sensitive skin population agreed with the statements concerning skin reactivity to cosmetics. *Statistical difference compared to the whole sensitive skin population ($P < 0.05$).

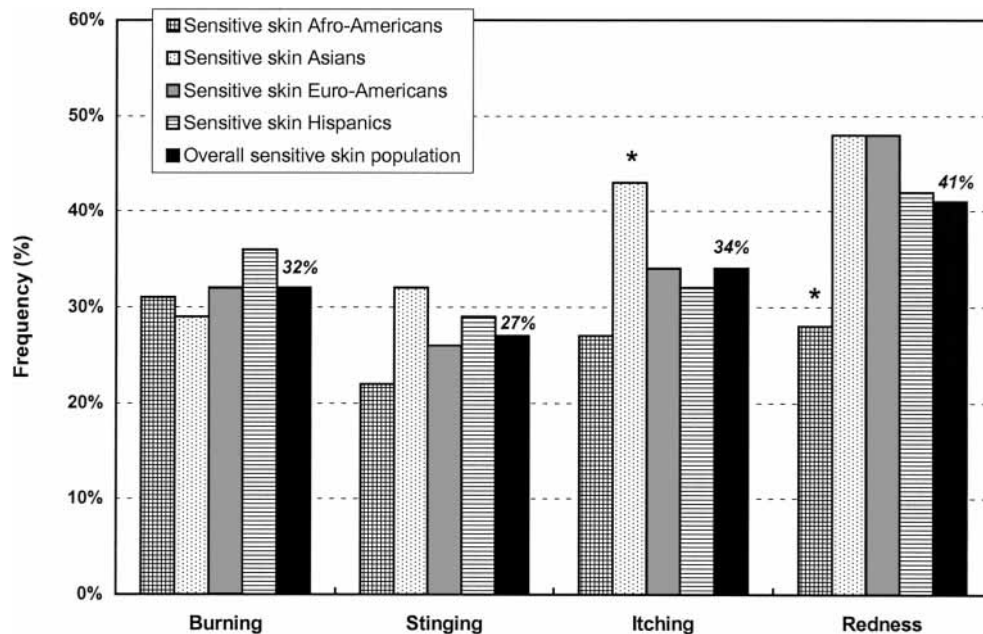


Fig. 3. Histograms showing the frequency with which each ethnic sensitive skin subpopulation and the whole sensitive skin population reported experiencing recurrent facial stinging, burning, itching sensations or redness. *Statistical difference compared to the whole sensitive skin population ($P < 0.05$).

able ethnicity among the sensitive skin subpopulation ($n = 420$). Table 2 gives the global list of the characteristic skin variables of each ethnic group within the sensitive skin population. Each listed variable in the table was statistically significantly over- or underexpressed in at least one of the four groups compared to the overall sensitive skin population.

For example, the variable 'easily irritated facial skin' was overexpressed in the Afro-American sensitive skin population (83.0%), compared to 75.5% for the sensitive skin population as a whole. The incidence of this skin condition for the remaining groups was 69.7% for the Asian, 70.1% for the Hispanic and 80.2% for the Euro-American sensitive skin population.

Factors of skin reactivity

Table 2 shows that most of the variables statistically linked to ethnicity were environmental factors. The frequency of sensitive skin women who considered themselves as not having skin reactive to wind, cold weather, sudden changes in temperature, air pollution and sun was higher in the Afro-American group than in the whole sensitive skin population. In contrast, Asians presented a higher prevalence of skin reactivity to wind and to sudden changes in temperature. Euro-Americans also reported more frequent skin reactivity to wind. Table 3 gives, per ethnic sensitive skin subgroup, the frequencies of skin reactivity for each environmental factor. Apart from skin reactivity to air pollution in the Afro-American group, which was not significantly lower compared to the whole sensitive skin population, the differences already highlighted in Table 2 were observed. The findings of Tables 2 and 3 concerning incidence of skin reactivity to air pollution in the Afro-American sensitive skin group are contradictory only in appearance. In fact, Table 2 concerns the modality 'disagree' and Table 3 'agree'. The incidence of 'disagree' (53.8%) in Afro-Americans differed significantly from the incidence (42.9%) in sensitive skin population, even when the incidences of 'agree' did not differ significantly (41.5% vs 50.0%). The apparent discrepancy comes from the 4.7% of sensitive skin Afro-American women who did not answer this item. The maximum skin reactivity incidence was reached with wind in Euro-American sensitive skin women: 74.5%. The prevalence of skin reactivity in the sensitive skin population was 39% for warm and 51% for changes in weather. There was no difference between ethnic groups for either of these factors.

In Table 2, note that the frequency of subjects who avoid the use of certain cosmetics due to induced discomfort was significantly lower in Euro-American sensitive skin women (70.8%) than in the whole sensitive skin population (78.3%). As shown in Fig. 2, this difference fits in with the tendency to lower incidences in induced rash or discomfort when Euro-Americans use new cosmetics.

Concerning other factors, the incidence in the entire sensitive skin population of skin reactivity to alcoholic beverages was 24%, to spicy foods 22%, to menstrual cycle 56% and to emotion or stress 65% (data not shown for the last two factors). The frequency of skin reactivity to alcoholic beverages was significantly lower in the Afro-American and Hispanic sensitive skin groups and higher in the Asian group. This latter group was also characterized by a more frequent skin reactivity to spicy foods. There were no significant dif-

ferences between the ethnic sensitive skin subgroups concerning skin reactivity to emotion or stress or to menstrual cycle.

Signs and symptoms of sensitive skin

Table 2 shows only 2 significant results concerning symptomatology. Recurrent itching sensation on the face was reported by 42.6% of Asian women with sensitive skin compared to 33.8% of the sensitive skin population as a whole. Whereas 58.3% of the entire sensitive skin population reported not to suffer from recurrent facial redness, this frequency reached 70.8% of the Afro-American sensitive skin women. We illustrate both these differences in Fig. 3, which gives the frequencies of each symptom for each ethnic sensitive skin subgroup. Considering the overall sensitive skin population, facial redness with an incidence of 41% was a more frequent self-reported symptom than the 3 neurosensory symptoms (stinging, burning and itching) with incidences of 27% to 34%.

Other variables

There was no significant difference for any of the ethnic sensitive skin subgroups concerning skin type, recurrence of acne or pimple breakouts, eczema (current or past), asthma or hayfever as compared to the entire sensitive skin population.

Discussion

Our survey was designed to delineate any existing differences concerning sensitive skin condition between ethnic groups living in the same geographic area. By 'sensitive skin', we mean somebody who readily experiences, on the face especially, discomfort or painful sensations with or without any visual signs.

The incidence of current eczema (11%) appears high in comparison with that reported previously (4.7%) in the USA (12). This difference could be explained by differences in methodology: self-reported or clinical assessment. Subjects, when questioned by telephone (or by mail), may have a tendency to exaggerate their skin condition or to confuse it with other skin disorders. To minimize this error source in our study, subjects were asked to refer themselves to a diagnosis previously given by a physician. In addition, our findings are in accordance with those obtained in a 1976 study of the UK adult population, in which a prevalence of 9% was reported for all types of eczema (13). Finally, it is possible that our study indicates an increase in the incidence of eczema in the USA dur-

ing the last 20 years. Such an increase has previously been reported in UK children (14).

The incidence of current or past eczema and asthma or hayfever seems to reveal that the Afro-American population suffers more frequently from atopic dermatitis than the other groups, and especially more than the Hispanic population. Although this phenomenon appears to be somewhat controversial (15, 16), previous studies have reported similar findings (17, 18).

The observed differences in age and in atopic diathesis between ethnic groups were not desirable for 'all things equal' comparisons, but they were perhaps inherent in the San Francisco population structure. To minimize this bias and to obtain strictly homogeneous groups would have required a greater number of phone calls. These differences were not desirable because of their established link with sensitive skin condition. The influence of age on skin sensitivity has already been documented (3); the prevalence of sensitive skin tends to decrease with age. Likewise, a recently published study has indicated that the incidence of atopy is higher among women with sensitive skin group than among those with nonsensitive skin (10).

Nevertheless, these differences between ethnic groups concerning population characteristics were fairly weak and, as seen before, incidences in eczema diathesis fitted in fairly well with previous published data (13). In sum, we believe that the study sample should be regarded as fairly reliable for comparisons between the different groups concerning self-reported sensitive skin condition.

Prevalence for self-reported sensitive skin is equivalent regarding the ethnic background

The data obtained from the survey provide strong evidence that self-perceived sensitive skin is a common phenomenon in the San Francisco area. 52% of women between 18 and 54 years of age agreed with the statement: 'I have a sensitive facial skin'. Approximately 30% of the total population strongly agreed with that statement. This incidence figure of around 50% for sensitive skin self-assessment closely mirrors the prevalence findings obtained in two previous epidemiological studies, with around 50% of self-perceived sensitive skin in the USA (3) and 51.4% in the UK (10) in female populations.

In the American study (3), environmental factors were reported to affect sensitive skin subjects more frequently than use of products. Our data confirm this conclusion in that in sensitive skin population the incidence of skin reactivity was approximately 50% to products but at least 60% to cold (60.2%), wind (61.7%) or sun (68.3%). We also

noted that, even though only 50% of sensitive skin subjects declared that they encounter discomfort when using a new cosmetic, these problems drive 78% of them to avoid certain kinds of cosmetics.

Particular ethnic features in sensitive skin condition

Slight differences concerning factors of skin reactivity and sensitive skin symptoms were observed. A comparison of the ethnic groups within the sensitive skin subpopulation (420 women) revealed that Afro-Americans reacted less to most environmental factors (wind, cold, sudden changes in temperature, air pollution, sun) and to alcoholic beverages. Fewer Euro-Americans avoided certain cosmetics due to skin reactivity but they reacted more to wind. Asians suffered more frequently from recurrent itching on the face and presented a greater reactivity to the wind and to food (spices, alcohol). Hispanics reacted less to alcohol. Apart from the weaker skin reactivity to wind and to cold weather for Afro-Americans and higher sensitivity to wind for Euro-Americans for which the Value-tests were up to 3, the observed differences, although statistically significant, were fairly weak and should be viewed concurrently with the total absence of difference in sensitive skin incidence among the various ethnic groups. These findings do not support the widespread idea that Asians (8), and especially Japanese women (19), appear to be more prone to subjective symptoms. This finding has to be modulated because Asian and Euro-American populations studied here live strictly speaking in the same place. Even though influence of climatic factors does not seem to be very important in self-reported sensitive skin (20), we are not sure that Asians living in their lands of origin have the same perception of sensitive skin as Asian subjects questioned here.

In conclusion, even though self-reported sensitive skin incidence does not appear to differ according to ethnicity, there are areas of difference between ethnicities regarding sensitive skin patterns. These ethnic variations mostly concern factors of skin reactivity and, to a lesser extent, its symptomatology. But, for the most part, we acknowledge the similarities in how women of varying ethnic backgrounds perceive sensitive skin condition. We note the limitations of questionnaires. These self-declared statements will benefit by further evaluation with controlled objective experimental evaluation; for example, using chemical probes to assess facial skin reactivity. However, a recent publication notes that these sensory irritant challenges may not always conform to the self-perception of sensitive skin (20). There is still scope

for improvements in the physiological characterization of sensitive skin that is undoubtedly common in the US female population whatever the ethnic background.

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