



## ORIGINAL ARTICLE

# Knowledge and Behavior Regarding Cosmetics in Koreans Visiting Dermatology Clinics

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**Background:** Cosmetics can affect the skin condition profoundly, and yet no survey has been performed in Koreans visiting dermatology clinics. **Objective:** To assess knowledge and consumer behavior regarding cosmetics in Koreans visiting dermatology clinics. **Methods:** A questionnaire consisting of 43 questions concerning demographics and use/knowledge/selection/purchase of cosmetics was given to patients and accompanying persons who visited dermatologic clinics in university and private clinic settings. **Results:** In total 1,015 subjects (73.2% females, mean age 32.5 years) completed the survey. Education level was college or higher in 72.8%. Thirty-one percent had been diagnosed with a skin disorder, atopic dermatitis and seborrheic dermatitis being the most frequent diagnoses (33.7% and 16.8%, respectively). The frequency of makeup/sunscreen/functional cosmetics use, amount of sunscreen use, recognition of functional cosmetics, and knowledge of shelf life were significantly correlated with level of education. Among

“functional cosmetics,” whitening products were used most frequently (29.2%). Regardless of education level, 79.2% purchased cosmetics without checking ingredients, and 85.7% were unaware of the all-ingredient-labelling regulations, and yet subjects considered ingredient the most important factor when purchasing a product. **Conclusion:** Outpatient subjects in their twenties and thirties are the most knowledgeable about cosmetics in Korea. (Ann Dermatol 29(2) 180~186, 2017)

**-Keywords-**

Active, Cosmetics, Skin care, Sunscreen

## INTRODUCTION

Cosmetology incorporates the most advanced scientific knowledge and technology including chemistry, pharmacology, molecular biology, genetic/new materials engineering, immunology, and neurology, etc. In the Republic of Korea, the legal foundation for the so-called “functional cosmetics” was laid out in 2000 by the Ministry of Food and Drug Safety. Labelling of the “functional cosmetics” is strictly regulated by the federal government, and such cosmetics include products that help with skin whitening, products that help improve wrinkles, and products that tan or protect the skin from the ultraviolet radiation. Korean government has been enforcing the “all ingredients-labelling law” for all domestic or imported cosmetic products over 50 g in weight or 50 ml in volume since 2008. Korean cosmetic market placed 10th in the global market in 2013, with total 6.83 billion US dollars and a global

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market share of 2.8% (2010~2013) and an annual growth rate of 4%. Consumption of cosmetics per person and male skin care product is number one in the world. Since use of many cosmetic products can lead to a higher chance of developing allergic or irritant contact dermatitis, dermatologists should be able to advise whether their patients need a “cosmetic diet” or not; however, there exists no basic data on consumer behavior regarding cosmetics use in Korea. Therefore, the authors attempted to assess the consumer knowledge and behavior regarding cosmetics in Koreans visiting dermatology clinics, thereby providing the basis for providing better quality care to our patients.

## MATERIALS AND METHODS

A questionnaire consisting of 43 questions concerning demographics and use, knowledge, selection and purchase of cosmetics was developed by the first two authors of this study and given to patients and accompanying persons who visited dermatologic clinics in 7 university and 3 private clinic settings. For statistical significance,  $\chi^2$ -test or Fisher’s exact test was used for categorical variables, and Mann-Whitney test or Kruskal-Wallis test for continuous variables. IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA) and R ver. 3.2.2 (<http://www.r-project.org>) were used for statistical analysis, and we considered  $p$ -values  $<0.05$  to be statistically significant.

## RESULTS

### Demographics

A total of 1,015 subjects completed the survey; 73.2% were female and 26.8% male. The ages of subjects ranged from 12 to 73 years, with a mean age of 32.5 years. Subjects in their twenties accounted for 42.1%, followed by thirties (30.9%), forties (13.6%), fifties (7.3%), and teens (4.9%). By level of education, the majority were college graduates or higher (72.8%), followed by high school graduates (22.8%) and middle school graduates (3.2%). By vocation, homemakers or students were most frequent (31.5%), followed by professionals (29.3%), office workers (21.5%), and sales (10.2%). Thirty-one percent of the subjects had previously been diagnosed with a dermatologic condition, of which atopic dermatitis was by far the most common (33.7%), followed by seborrheic dermatitis/acne/folliculitis (16.8%), contact dermatitis (12.5%), psoriasis (9.9%), urticaria (6.9%), and vitiligo (3.6%), etc.

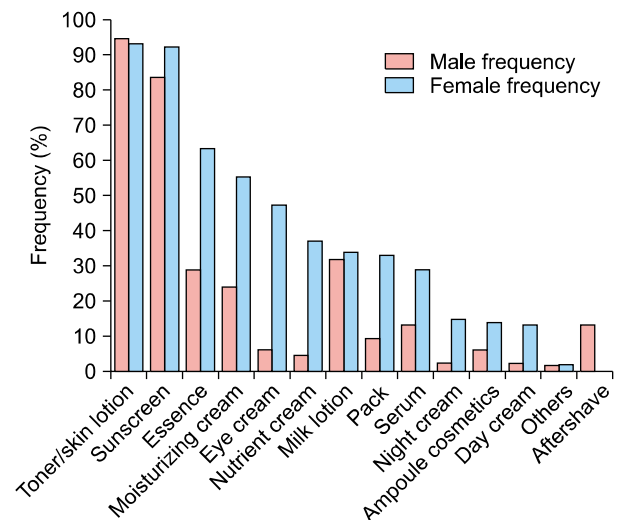
### Usage of cosmetics

In total, 70.9% of the subjects used skin care and colour

cosmetic products, 12.0% used only skin care products, and 17.1% did not use any cosmetics. Among those who use both skin care and colour products, 84.6% were female and 15.4% male. The mean age at which subjects started using cosmetics was  $20.3 \pm 3.1$  years (range, 13~40 years). Subjects demonstrated a definite trend of using cosmetics at an earlier age as their ages got younger; subjects in the teens started wearing makeup at 15.9 years; those in their twenties, at 19.3 years; those in their thirties, at 20.9 years; those in their forties, at 21.7 years; those in their fifties, at 22.9 years; and those in their sixties, at 24.0 years. Time spent on wearing the products was most commonly 10 to 30 minutes (49.3%), followed by  $<10$  minutes (44.2%), 30 minutes to 1 hour (6.3%), and  $>1$  hour (0.1%). Thirty-six percent of subjects wore makeup 5 to 6 days a week; 26.0%, everyday; 17.3%, 3 to 4 days a week; 10.7%, 1 to 2 days a week; and 9.9%, only on special occasion.

In total, the most frequently used skin care product was toner/skin lotion (93.4%), followed by sunscreen (90.9%), essence (58.0%) and moisturizing cream (50.5%). In women, toner (93.2%) and sunscreen (92.2%) were similar in frequency of use. In men, the most frequently used skin care product was toner (94.6%), followed by sunscreen (83.7%) and milk lotion (31.8%) (Fig. 1). Toner was the most popular skin care product across all age groups, whereas essence, serum, milk lotion, nutrient cream, and eye cream use was proportionally increased in higher age groups. A majority (69.4%) of subjects used 3 to 6 skin care products each time.

The most frequently used makeup product in both genders was BB cream. In women, BB cream was used most fre-



**Fig. 1.** The frequency of skin care product use in Koreans visiting dermatology clinics.

quently (57.0%), followed by lipstick (52.6%), eye shadow (48.8%), eyeliner (48.1%), lip glow/lip gloss (44.4%), eyebrow pen/pencil (42.2%), powder/pact (41.7%), and mascara (40.5%). In men, the most frequently used makeup product was BB cream (21.0%), followed by CC cream (8.0%), lip glow/lip gloss (7.0%), eye shadow, eyeliner, eyebrow pen/pencil, and liquid foundation (3.0% each) (Fig. 2). With increasing age, liquid foundation, air cushion type foundation and lipstick use demonstrated an increasing trend, whereas BB cream, concealer, blusher, eye shadow, mascara, eyeliner, lip tint, and lip glow/lip gloss showed a decreasing trend. A majority (62.8%) of subjects used 3 to 7 makeup products at a time.

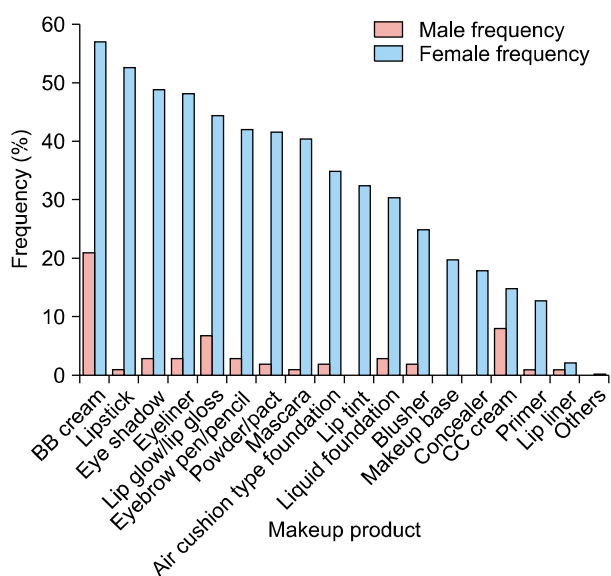


Fig. 2. The frequency of makeup product use in Koreans visiting dermatology clinics.

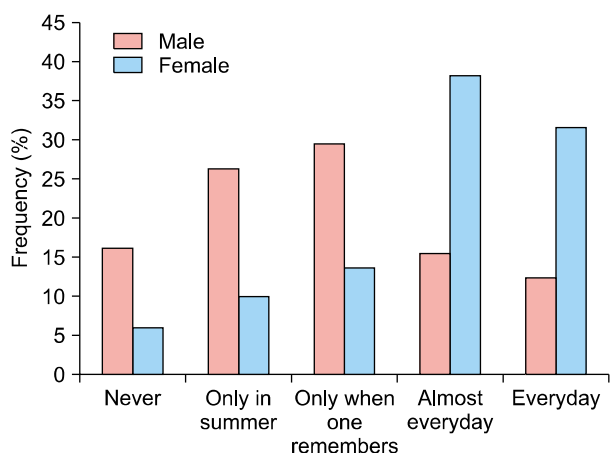


Fig. 3. The frequency of wearing a sunscreen differed between men and women, with women wearing it significantly more frequently ( $p < 0.001$ ).

Frequency of sunscreen use was as follows: only in the summer (55.6%), never (19.4%), only when one remembers (13.0%), almost everyday (10.0%), and everyday (2.1%). Women wore sunscreen more frequently than men ( $p < 0.001$ ; Fig. 3). The amount of sunscreen used on the face was most frequently 1-cm diameter (55.3%), followed by 0.5 cm (19.4%), 1.8 cm (13.0%), 2.4 cm (10.3%), and 2.65 cm (2.0%). The higher the education level, the more frequent was the use of sunscreen ( $p < 0.005$ ) and the larger the amount of sunscreen applied ( $p < 0.05$ ). The initial cleansing method differed between men and women in frequency (Fig. 4). In women cleansing oil was the most frequent method, followed by cleansing foam, cleansing cream, cleansing water, and cleansing milk; in men a majority used cleansing foam, followed in a minority by bar soap, cleansing cream, and cleansing oil.

In men, shaving was done most commonly using a disposable razor (58.5%), followed by electric razor (39.8%), and barber shop (1.6%). The shaving method showed a bipolar pattern in different age groups: the younger the subject, the more frequent was the use of disposable razor, and as the subjects aged, they preferred electric razor more (Fig. 5).

The average age of patients visiting private clinics was 30.8 years, which was significantly younger than that (33.9 years) of the patients visiting university hospitals ( $p < 0.001$ ). Interestingly, none of the patients visiting private clinics were using cleansing oil, whereas 31.3% of those visiting university hospitals were using it. More patients from private clinics were using cleansing water, cream and tissue for cleansing purposes. More patients

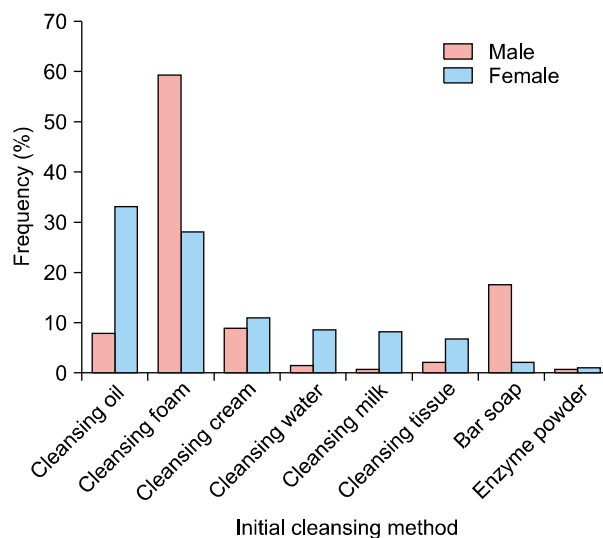
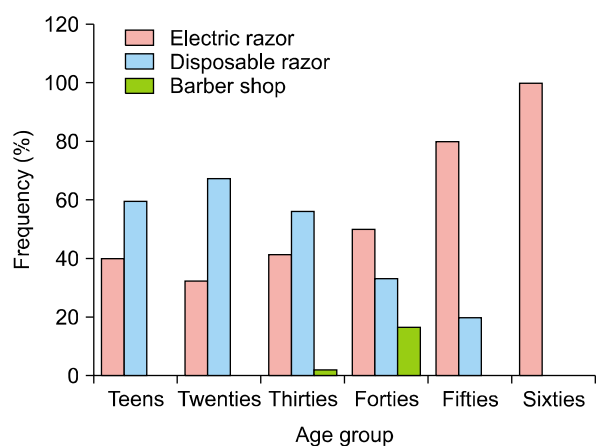


Fig. 4. The frequency of initial cleansing method in each gender shows a different pattern between genders.



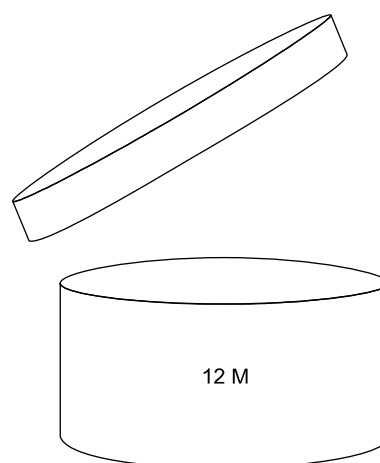
**Fig. 5.** Differing pattern of shaving method in each age group. The younger the subject, the more frequent was the use of disposable razor.

visiting private clinics had used functional cosmetics ( $p < 0.001$ ), had ingredients that they absolutely avoided ( $p < 0.001$ ), and had experience using “all ingredients-labelling” information ( $p < 0.001$ ) than patients visiting university hospitals.

#### Attitudes and knowledge

In total, 54.8% thought use of eye cream was unnecessary. However, there was a significant difference between men and women: 50.4% of women thought it necessary to use eye cream whereas 15.5% of men thought that way ( $p < 0.001$ ). In total, 89.5% of the subjects had heard about “functional cosmetics,” and 78.3% had experience using them; when subdivided into each gender, 56.0% of men had never used any functional cosmetics before, in contrast to 15.6% of women. Among the functional cosmetics, women used whitening products most frequently (29.5%), followed by anti-wrinkle products (23.1%) and moisturizers (18.0%), whereas in men, anti-acne products were used most frequently (31.1%), followed by whitening products (26.1%) and moisturizer (16.0%). The product both men and women were most in need of was effective moisturizers (26.7%), followed by whitening products (22.0%). The use of functional cosmetics correlated with education level ( $p = 0.004$ ). A majority (69.5%) of subjects thought that functional cosmetics should be used one at a time. In total 27.9% of subjects had experienced adverse cosmetic events (ACE) after using functional products, among which whitening products (26.2%) and anti-acne products (24.1%) were the most frequent culprits. Female subjects experienced ACE more frequently than males (30.0% vs. 14.9%,  $p < 0.001$ ).

In total 20.8% of subjects stated that they check the in-



**Fig. 6.** Period-after-opening symbol signifying a shelf life of 12 months after opening.

redients of cosmetic products before purchasing them; however, 60.6% of those respondents had no ingredient which they avoided. For those who answered that they avoided specific ingredients, preservatives (37.6%) were by far the most frequently avoided ingredients. Only 14.3% of subjects knew about the “all ingredients-labelling law”; accordingly, only 10.2% had experience using the information given by the labelling. The knowledge about this law diminished as the subjects got older ( $p < 0.005$ ). Majority (65.7%) of subjects said allergies can develop toward a product which they had been using without any problem before. Men were less knowledgeable about this fact than women ( $p < 0.001$ ), with 49.2% responding that no allergies can develop anew to a product they had been using before, vs. 31.6% of women. Sixty-seven percent of respondents correctly answered that organic or natural products were not preservative free. Majority (79.5%) of subjects did not know what paraben was. Most (71.1%) of those who said they knew what paraben was answered correctly that it was a preservative; however, 4.9% of those respondents said paraben was paraffin. Over half (55.8%) thought paraben was bad for our body. This belief correlated with education level ( $p < 0.001$ ). Age-wise, more subjects in their twenties and thirties often knew what paraben was ( $p < 0.001$ ) and thought that paraben was detrimental to health ( $p < 0.001$ ). More patients visiting private clinics thought paraben was bad than patients visiting university hospitals (35.6% vs. 14.2%,  $p < 0.001$ ). In total 53.5% of respondents said they do not wash makeup tools on a regular basis. A majority (91.4%) of subjects were aware that there is a difference in shelf life of a product once it is opened. More women (92.6%) were knowledgeable about this fact than men (85.0%) ( $p < 0.005$ ).

However, when asked about the meaning of the period-after-opening (PAO) symbol (Fig. 6), only 39.7% of subjects said they know what it means; 48.3% of those respondents said it means “the product can be used for 12 months,” 44.5% said precisely that it means “the product can be used for 12 months after opening,” but 6.3% said it means something about the volume of the product. There was a significant difference between men and women in knowledge of the symbol ( $p < 0.001$ ), with 22.1% of men and 43.0% of women having knowledge. The higher the education attained, the more likely the subject was to know what the PAO symbol means ( $p < 0.009$ ). According to age, the knowledge peaked in the second decade and decreased gradually in adjacent age groups on either side ( $p < 0.001$ ). More patients visiting private clinics knew the meaning of PAO symbol than patients visiting university hospitals (52.7% vs. 34.1%,  $p < 0.001$ ).

A majority (67.0%) of subjects thought the price of cosmetic products is not proportional to their effects. This thought was proportionally more prevalent with higher education level. When asked about preference, 35.0% preferred domestic products, 26.5% preferred imported ones, and 38.5% had no preference. The reasons for preferring domestic products were faith in the brand (27.4%), followed by the quality (25.5%), price (22.6%), and good fit to the skin type (21.3%). The reasons for preferring imported products were quality (39.0%), faith in the brand (32.2%), and good fit to the skin type (14.8%) in decreasing order. Among different age groups, subjects from the twenties to the fifties increasingly preferred domestic products with age ( $p < 0.001$ ).

About expenditure, 45.1% and 43.4% of subjects spent \$10~50 per month on skin care and makeup products, respectively. Men spent less money per month on skin care products than women ( $p < 0.001$ ). In women, the most frequent purchase channel was brand shop (31.9%), followed by department store (31.4%) and internet (12.0%); in men, brand shop (37.4%) followed by internet (19.9%), department store (19.1%), and large retail store (11.5%). Age-wise, younger generation preferred brand shops whereas older generation preferred department stores. The older the subject, the more importantly was ingredient considered; the younger the age, the more important was the recommendations by friends or bloggers. In women, the most important factor affecting the selection of a product was ingredients (28.8%), recommendation by friends or bloggers (27.2%), price (17.2%), and recommendation by sales person (10.8%), whereas the price (34.1%) was by far the most important factor in men, followed by recommendation by friends or bloggers (20.7%) and recommendation by sales person (15.6%). In both genders, ad-

vertisement (5.5%), volume (3.0%) and design (0.9%) of products played very minor roles in making a selection.

## DISCUSSION

The demographics of the present study are comparable to those of a previous cosmeto-vigilance survey taken in pharmacies in Naples, Italy, in which females accounted for 75.8% of total respondents and ACE affected 24.4% of total cosmetic users. In the Italian study, ACE occurred more frequently in females (26.5% female vs. 17.4% male)<sup>1</sup>, similar to the present study. Our results showing that females account for the majority of personal care product users are also in agreement with a US study conducted in California<sup>2</sup>.

In the present study, a definite trend of people using cosmetics at an earlier age was seen. This may be associated with internet and social media use where ordinary individuals post their photos and receive instantaneous feedback on a global level, as well as peer pressure and the influence of young Korean pop stars and actors whose skin is “picture perfect.” A similar usage pattern was demonstrated in the US study, where younger adults were heavier users of many personal care products with exceptions for health-related products<sup>2</sup>.

Korean dermatologists educate their patients to apply a large Korean coin-sized amount of sunscreen on the face, which is 2.65 cm in diameter; however, this survey shows that most people only apply 1-cm size, which is 1/7 of what is recommended, or less. Still the average per capita sunscreen consumption in South Korea (40 ml) was the highest in Asia-Pacific region in 2012, where average consumption was 20 ml per year worldwide; regional consumption of European Union (EU) was 52 ml, Asia-Pacific was 4 ml, Latin American was 29 ml, and North America was 101 ml<sup>3</sup>. The results of this survey showing education level correlating with the frequency and amount of sunscreen use is concordant with the US study<sup>2</sup>; this may be associated with higher health awareness or higher income and therefore better affordability. More public education is warranted to encourage Koreans to use more sunscreen both in frequency and amount.

In women, cleansing oil was the most popular cleansing method, followed by cleansing foam. The fact that men use cleansing foam much more frequently than cleansing oil, unlike women, probably reflects the oilier complexion of men in general.

The fact that a highly functional moisturizer is the product most needed by Korean subjects may be a revelation of unfulfilled needs in this product category.

The purpose of the Korean law mandating that all cos-

metics be labelled with their ingredients is to help patients with contact allergy to avoid sensitizers in cosmetics and to aid dermatologists in identifying the causative allergen in contact dermatitis to cosmetics, in a similar vein to the EU Cosmetics Directive<sup>4</sup>. The law was shown to be mostly unknown to the study subjects since only 14.3% of them were aware of the existence of such law. This knowledge did not correlate with the level of education but was inversely correlated with age, with more subjects in their twenties (18.6%) and thirties (15.4%) having knowledge than other age groups. This might be associated with easier accessibility to internet and smartphone applications by younger adults than more mature population. For example, while most (79.5%) of the patients in the present survey did not to know what paraben is, those in their twenties and thirties more frequently knew what it is than other age groups. The knowledge was independent of sex and educational level. Europeans seem to find it difficult to understand ingredient labelling as well; 46% of Danish patients with contact allergy to preservatives and fragrances had difficulty reading the ingredient labelling of cosmetics, and this was significantly correlated to low educational level<sup>5</sup>. In that series, more patients with allergies to preservatives than to fragrance experienced major difficulties with ingredient label reading, probably because of the necessity of also being aware of formaldehyde releasers<sup>5</sup>. Even if the subjects read the cosmetic contents, the information would not mean anything to them if they could not look them up easily. Another Danish study reported that non-compliance with instructions on reading the ingredient labelling is not only a question of patients' lack of knowledge but also the result of persons not possessing the resources necessary to act in accordance with the medical instructions<sup>6</sup>. This may well apply to Korean patients, too. Knowing is not the end of the problem; taking action to avoid the causative allergen is the ultimate behavior expected of the patients.

In the present study, we tested the subjects' knowledge and attitude towards paraben, a widely used preservative. Concerns have been raised regarding paraben due to the possible association of the compound with breast cancer<sup>7</sup>. Public pressure has persuaded several governments to enforce regulations on the use of parabens in consumer products<sup>8</sup>. However, parabens are ubiquitous, with low levels being detected in rivers, drinking water sources, soil, house dust, human tissues, and bodily fluids<sup>9,10</sup>. Parabens bind human estrogen receptors with affinities 10,000 to 1,000,000 times less than estradiol<sup>11,12</sup>. Several studies have concluded that there is no causal relationship between parabens and breast cancer<sup>13</sup>. Parabens are degraded once applied on the skin, and even if they are ab-

sorbed percutaneously, they are hydrolysed in the body and therefore are not likely to accumulate in tissues<sup>14,15</sup>. Governmental regulatory agencies have agreed that the current concentrations of parabens are safe for consumer use<sup>8</sup>. Korea and the EU allow a maximum paraben concentration of 0.4% for any individual paraben and 0.8% for total paraben concentrations<sup>14,16</sup>; in the US and Canada, there are no laws regulating paraben concentrations. In the present survey, almost 80% of subjects were shown not to have any knowledge of paraben, and among those who did, opinion was divided whether paraben is detrimental to health or not, reflecting the controversy and media scare generated over paraben. The level of education correlated with sensitivity to the media scare.

It is interesting to find that women do not prefer internet or large retail stores when purchasing skin care or cosmetic products, whereas men feel more comfortable or find it more convenient to shop online or in large retail stores. Regarding expenditure, men prefer cheaper products whereas women prefer products with good ingredients. In summary, subjects in their twenties and thirties are the most knowledgeable about cosmetics in Korea. Women apply sunscreen more frequently than men, and younger and more educated subjects use it more frequently and more generously; most apply 1-cm size. Among "functional cosmetics," whitening products (29.2%) are used most frequently, and yet the product most needed is an effective moisturizer (26.7%). Regardless of level of education, most subjects (79.2%) purchase cosmetics without checking ingredients, and most (85.7%) do not know about the all-ingredients-labelling law. Most subjects (60.3%) do not understand the meaning of expiration labelling. It would be interesting to compare data from outpatients and the general population in the future study.

The limitations of the study include some selection bias since the subjects do not represent the entire Korean population; the university respondents consisted mostly of patients with skin problems, and private clinic respondents consisted mostly of aesthetically driven individuals who were interested in improving their skin appearance. Geographically the majority of respondents were from Seoul.

With the basic data obtained through this survey, we hope to be able to provide better quality medical care to our patients. Dermatologists should be more vigilant to look for possible causes of ACE in their patients and to advise patients to use the right cosmetics for their skin condition and manage ACE. At the same time, it is hoped that the information gathered through this survey be used to help government authorities promulgate regulations more effectively and cosmetic industries focus better on consumer needs.

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## CONFLICTS OF INTEREST

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The authors have nothing to disclose.

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