



## Studying Women's Allergy Rate to Cosmetics in Kashan, Central Iran

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### ABSTRACT

The frequency of using cosmetics among different age groups of women is very prevalent in Iran. Considering the importance of the high rate of using cosmetics which are the major reasons of allergic contact dermatitis, this study was conducted to consider women's allergy rate to cosmetics in Kashan. In this research, data were gained through 800 standard questionnaires completed by women in Kashan. Sampling was random and multistage cluster. After obtaining the data, the graphs and tables were drawn, and the data were analyzed by Chi-square and Mann-Whitney. The highest rate of permanent use of cosmetics was in the age group of 20-29 years old. The results showed that 27% of women have allergy to cosmetics. The highest rate of allergy to cosmetics was allergic rhinitis with 24.4%, and the lowest was respiratory allergy with 6.8%. In 43.4% of the individuals, having a history of allergy was very effective in using these materials again. Although using cosmetics caused allergy, it did not reduce the use of cosmetics ( $P < 0.243$ ). The effect of having a history of allergy to cosmetics has a significant relation with the age of women. Using cosmetics is reduced by the increase in age ( $P < 0.001$ ). Using personal care products needs rational and global safety regulations.

**Keywords:** Women, Cosmetics, Allergy, Dermal disease, Allergen, Iran

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### INTRODUCTION

Majority of people with different social classes use cosmetics as a routine part of body protection [1]. Millions of users utilize personal care products (PCP), cosmetics and their compounds daily [2]. Allergy is the rapid reaction of body to allergens, which the individual's immune system was stimulated by. Allergen is a substance that causes an allergic reaction in certain individuals. Allergy is explained as immunologic sensitivity. There are four types of reactions of increasing the sensitivity. Type I and III are antibody-mediated;

Type II, IgG/IgM and matrix-associated antigens, Type III, IgG/IgM and soluble antigens; Type IV, T cell-mediated antigens. Cosmetic products may cause reactions of type I or IV [3]. Irritant contact dermatitis is a non-immunologic inflammatory reaction which is caused after dermal contact with chemicals and physical factors. Incorrect exposure to soaps and cosmetics can cause irritant contact dermatitis [4]. Allergic rhinitis (AR) is a prevalence disease, which its symptoms are nasal obstruction, sneezing and rhinorrhea [5]. There are different allergic factors including inhaling and edible allergens, contact by different materials, insect secretion, drug allergens, etc. [6-9]. Mites, mosquitoes, bugs, lice, and some biting flies can cause skin allergies. Severity of allergy depend on people sensitivity and arthropods species

[10-13]. Atopic allergic disorders like asthma, allergic rhinitis and eczema among the world's population is a health problem [9]. Epidemiologic studies have reported the increase of outbreak of allergic disorders in many countries [14]. The prevalence of allergy to cosmetics among public is less than 1% [15-17]. Most of the people who have contact dermatitis allergy caused by cosmetics are women aged 20-55 years old [16, 17]. Due to the extensive use of cosmetics, supervising their side effects is very important [18]. Irritant and allergic contact dermatitis are the unwanted effects of drugs and cosmetics expansion [19]. Use of cosmetics is mostly limited to dermal exposure. Generally, sprays affect skin, hair and respiratory system and require special considerations. Allergic reactions to cosmetics are rapidly increasing [20]. Cosmetics allergens involve skin by direct contact, contact with contaminated surface, and contact of hand with sensitive parts like eyelid. Allergic contact reactions may cause reactions such as hives and Allergic Contact Dermatitis (ACD). Cosmetics including personal care products, perfumes, and herbal compounds are the major causes of allergic contact dermatitis. The most important contact allergens are perfume and preservative factors, but reactions to hair dyes, nail polishes, sunscreen creams, etc. may also occur [21, 22]. During 1958-1959, cosmetics containing halogenated salicylanilide caused a communicable disease of allergic reaction in the UK and other regions. During the classical period, hair dyes contained heavy metals such as lead, mercury, and cadmium oxides. Hair dyes are the most important products of studied materials in the industries. Their compounds are the most important ones which are used in cosmetic industries, and are classified to oxidative (permanent) dyes, temporary dyes, metal salts, and natural dyes [2]. Nowadays, lots of men and women dye their hair. P-phenylenediamine (PPD) is the main ingredient of permanent hair dyes. This material can cause allergy, acute dermatitis, intensive skin swelling, intensive edemas, intensive skin sickness, lymphopathy, asthma, neutrophilic, and eosinophilic [23, 24]. In Denmark and USA, 75% of women use hair dye. In Japan, the prevalence of using hair dyes in the years of 1992-2001 among the girls were 14-41% and the women were 6-85% [23]. The results of Nohynek (2010) study showed that PCP was safe but needed safety regulations [2]. The study of Tyhssen (2008) indicated that the prevalence of sensitivity to PPD among dermatitis patients in Asia, Europe, and North of America is high. In Europe, sensitivity is higher in women rather

than men [23]. The results of Angerer (2011) study showed that 16% of the eczema patients in Europe were sensitive to perfume ingredients. Near 1-3% of population of Europe were sensitive to perfume ingredients [25]. In the study of Anton (1987), it was determined that 4.2% of the patients had allergy to cosmetics and personal care products. In 45.1% of cases, the ingredients of perfumes and 11% of preservative materials were the cause of allergy and sensitivity [26]. The results of Nielsen (2001) study in Denmark showed that the prevalence of allergic contact dermatitis to cosmetics allergen in the years of 1990-1998 had been doubled [27]. In the study of Darbre (2009), it was indicated that using under arm antiperspirant could cause breast cancer [28]. Considering the frequent use of cosmetics, supervising their side effects is very important. Since usually allergy appears as the result of using cosmetics, this study was aimed to investigate women's allergy rate in Kashan. The results of this study can improve the health status for using cosmetics.

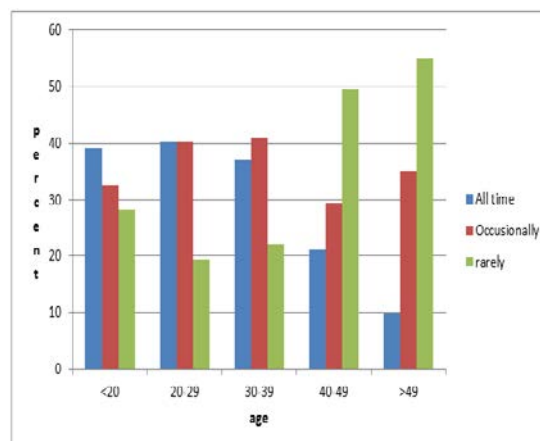
#### MATERIALS AND METHODS

This descriptive study was done through standard questionnaires on 800 women in Kashan. They were selected at random and multistage cluster sampling. First, according to the municipality's map, Kashan area was divided into 400 clusters, and among them, 40 clusters were selected randomly. Then, 20 houses were selected from each cluster at random. Selection of houses was based on the building number of each house, and one house was selected out of every 5 building numbers.

The validity of the questionnaire was confirmed by the experts. Then, the questionnaire was confirmed by experts. CVR (Content Validity Ratio) and CVI (Content Validity Index) were calculated as 0.99 and 1, respectively. To determine the reliability of the questionnaire, it was given to 40 cosmetics consumers and the Cronbach Alpha was calculated as 0.73. In this study, the rate of allergy in cosmetics' users was determined through 10 questions about education status, individuals' age (All of the women's were aged 12-77 years old; less than 12 and more than 77 years old were exclusion criteria), and different allergies. For gaining the data, the questionnaires were given to women to fill it out. Data were drawn in graphs and tables, and analyzed by Chi-square and Mann-Whitney. The rate of Participation was 95%.

**RESULTS:**

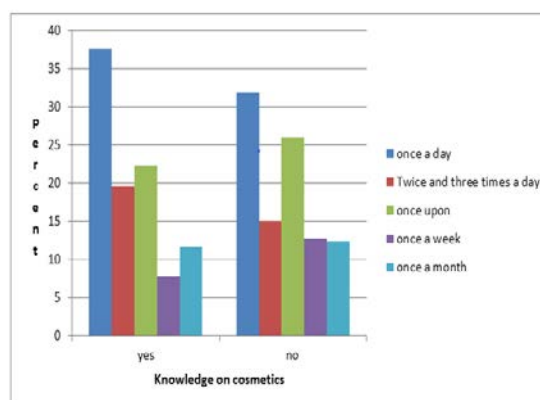
The gained data indicated that the studied individuals were in the age group of 12 to 77 years old, with the average age of 29 years. Individuals with the age less than 30 years used cosmetics more than others. However, by getting older, the rate of permanent use of cosmetics decreased. The highest rate of permanent use of cosmetics was 40.3% in the age group of 20-29 years old, and the lowest was 10% in the age group of older than 49 years old ( $p < 0.001$ ; Figure 1). The results of the study showed that the rate of using cosmetics was 35.3% once a day, 17.6% several times a day, 23.8% once in some days and 9.8% once in some weeks. 39.2% of individuals who had enough knowledge about the effects of using cosmetics, permanently used them. Only in 12.6% of the individuals who had enough knowledge, the rate of using cosmetics decreased ( $p < 0.034$ ; Figure 2 and Table 1). The results showed that only 38.4% of women always use specific brands while 61.6% do not. 64.2% of women had changed their cosmetics brands. The results indicated that the most important reason for changing the brands was that the previous ones were inappropriate for the skin of 45.6%. Other reasons were 14.3% advertisements, 12.3% expensiveness of the previous brands, 8.8% not having access to other brands, 7.8% allergy, and 7.6% getting more beautiful with the new brands. The results showed that 27% of the women had allergy to cosmetics, 53.9% of the individuals did not have any allergy to cosmetics, and 19% could not determine if they had allergy. The highest rate of allergy to cosmetics was 24.4% with rhinitis allergy, and the lowest was 6.8% with respiratory allergy. In 43.4% of the individuals, having a history of allergy was very effective in using the same materials again. The rate of using cosmetics permanently in the individuals with a history of allergy in comparison with the ones without a history of allergy was significant. However, this difference was not statistically significant ( $p < 0.243$ ; Figure 3). The highest rate of respiratory allergy was related to hair color (21.3%), and the lowest was eye linear (2.3%); this difference was statistically significant ( $p < 0.019$ ). The highest rate of Skin allergy was related to nail polish (45.5%), and the lowest was eye shadow (0%). However, this difference was not statistically significant ( $p < 0.145$ ).



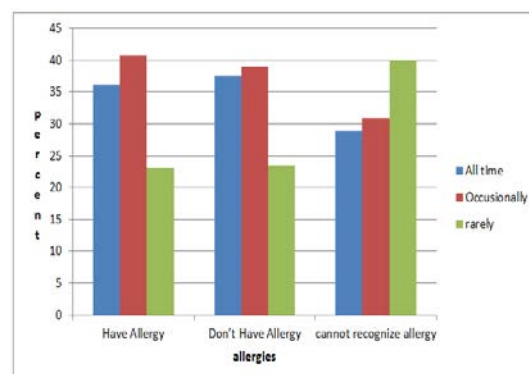
**Fig. 1.** The influence of age on cosmetics usage

**Table 1.** The influence of Knowledge on cosmetics usage

Using cosmetics / Knowledge about cosmetics	No (%)	YES (%)	(p)
always	101 (30.4%)	183 (39.2%)	0.034
sometimes	133 (40.1%)	170 (36.4%)	
rarely	98 (29.5%)	114 (24.4%)	
Total	332 (100%)	467 (100%)	



**Fig. 2.** The frequency of knowledge on the period of cosmetic usage.



**Fig. 3.** The rate of allergy and using cosmetics in terms of time.

## DISCUSSION

The results of this study showed that using cosmetics was very common among women, and there was a relation between using cosmetics with age, allergy rate, and knowledge about cosmetics ( $P < 0.034$ ). Individuals in the age group of under 30 years old had the most permanent use of cosmetics. However, by getting older, the rate of permanent use of cosmetics decreased ( $P < 0.001$ ). This result was similar to the studies of Fatehi (2008), Manova (2013), Kiani (2013), Norudin (2010) and Eiermann (1977-1980) [18, 29-32]. The results showed that 64.2% of women had changed their cosmetics brands. The most important reason for changing the brands was that the previous brands were inappropriate for the skin (45.6%). Other reasons were advertisements, expensiveness of the previous brands, not having access to other brands, allergy and more beauty of the current brands, respectively. According to the study of Khraim (2011) in Emirates, factors such as brands, quality of the products, price, design, etc. were the effective factors for women's loyalty to specific brands, which was similar to the results of this study [33]. The results showed that 27% of women had allergy to cosmetics while 53.9% did not. Meanwhile, 19% could not determine if they had allergy. The study of Angerer (2012) showed that 16% of eczema patients in Europe were sensitive to perfume ingredients. Near 1-3% of the population of Europe were sensitive to perfume ingredients [25]. Anton (1988) remarked that nail cosmetics and perfumes were 13.4% and 8.4% responsible for causing allergy in the patients of contact dermatitis, respectively [34]. Also, the results of this study showed that the highest rate of allergy to cosmetics was rhinitis allergy, and the lowest was respiratory allergy. In 43.4% of the individuals, having a history of allergy was very effective in applying these materials again. The individuals with a history of allergy significantly used cosmetics permanently more than individuals without a history of allergy. However, this difference was not statistically significant ( $P < 0.0243$ ). These results were similar to the study of Warsaw (2001-2004) in the north of America [35]. Nowadays, using cosmetics has a high prevalence in Iran. This issue has different reasons such as lack of knowledge about the problems and risks of using these materials, attracting attention of others, lack of information, and blindly following the media. By increasing the positive role of health authorities in giving awareness to people about the risks of excessive use of cosmetics and

the fact that some of them are unhealthy and fake, the rate of health and economic damages to the society can decrease [36-38].

This study showed that a large number of women suffer from cosmetic allergy. Variables such as population characteristics, allergy rate, brand name (Registered trademark), knowledge and information about cosmetics are the effective factors on the rate of using cosmetics by women. Considering the widespread use of cosmetics, supervising their side effects are very important. Using cosmetics more than usual shows a new phenomenon inside the society, which does not necessarily show the social health improvement. Using personal care products requires national and global safety regulations.

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