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Contact dermatitis due to cosmetics and skin care among female senior high school students in Kenjeran, Surabaya

Annora Clianta Khalida Siregar [1], Damayanti [2,*] and Gadis Meinar Sari [3]

[1] *Medical Program, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[2] *Department of Dermatology Venereology and Aesthetics, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[3] *Department of Physiology and Medical Biochemistry, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.*

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Abstract

Contact dermatitis (CD) is an inflammatory reaction caused by direct contact with certain substances. Contact dermatitis is usually divided into allergic contact dermatitis (ACD) and irritant contact dermatitis (ICD) based on the etiology. Cosmetics and skin care products are common causes of CD that are often used by female adolescents. This study aims to know the profile of CD caused by cosmetics and skin care among female adolescents in SMAN 3 Kenjeran. This study is an observational descriptive cross-sectional study. This study used consecutive sampling method with the sample size of 74 subjects. Data were collected using a written questionnaire and facial inspection done by dermatologists. The results of this study were that 17 out of 74 subjects (23.0%) had CD during this research, with the majority being ICD (70.6%). Most subjects use both cosmetics and skin care (96.0%). Most subjects were found to have previous history of CD (68.9%), and facial wash is the most reported product for causing CD. Most subjects do not have a history of atopy (66.7%). The percentage of subjects that reported a history of atopy are slightly higher in subjects with CD (41.2%) than subjects without CD (34.6%). In subjects with CD, atopic dermatitis is the most common form of atopy, and in subjects without CD, allergic rhinitis is the most common.

Keywords: Contact Dermatitis; Female Adolescents; Cosmetics; Skin Care; Human and disease

1. Introduction

Contact dermatitis (CD) is a skin condition cause by direct contact with substances that cause inflammation. Based on the etiology, CD is generally classified as allergic contact dermatitis (ACD) or irritant contact dermatitis (ICD). Any area of the body can be affected by CD, but it is often found in hands, face, and neck [1] Cosmetics and skin care are one of the most common etiologies of CD. In a retrospective study conducted in RSUD Dr. Soetomo on CD patients from 2018 to 2019, it is found that in 57,6% ACD cases, cosmetics is the causative substance [2].

Individuals of the female sex are more prone to CD caused by cosmetics and skin care. This is due to the high duration and frequency of exposure to the causative substance. In a retrospective study conducted in RSUD Dr. Soetomo from 2014 to 2017 for ACD caused by cosmetics (which included both cosmetics and skin care), it is found that 93,4% of CD patients are female. The study also found that most of the patients were in the age range of 20-30 years, followed by those aged 10-20 years [3]. This age range is considered to be part of the adolescent group, according to WHO [4].

Cosmetics and skin care usage in adolescents may be motivated by changes in their physique due to puberty which heightens their attention to how they are perceived. This may push them to buy or experiment with more products, which increases risk of CD [5]. The risk of CD may be increased in female senior high school students, due to higher use of cosmetics and skin care products compared to their male peers and junior high school students [6]. Environmental

* Corresponding author: Damayanti

factors in Kenjeran such as hot and humid weather may also exacerbate the occurrence of CD [7]. This study aims to know the profile of CD caused by cosmetics and skin care among female senior high school students.

2. Material and methods

This study is an observational descriptive study. The research design used for this study is cross-sectional. The sample was collected using consecutive sampling method, and the sample size was 74. The research was conducted in SMAN 3 Kenjeran, Surabaya, Indonesia, in August 2024. The inclusion criteria of this study were samples who are 10-19 years old and use cosmetics or skin care products. The exclusion criteria of this study were samples who are unwilling to participate. The instrument used in this study was a written questionnaire with questions that include history of atopy, history of CD, and contact frequency. Facial inspection was performed by dermatologists to assess presence of CD.

3. Results and discussion

This study covered 74 subjects that fit into the inclusion criteria. Subjects who participated in this research were within 15-18 years of age.

3.1. Prevalence of Contact Dermatitis

In this research, prevalence of CD was determined through facial examination conducted by dermatologists present during the data collection. It was found that 17 out of 74 subjects have contact dermatitis (23.0%).

Table 1 Distribution of contact dermatitis types

Diagnosis	**n (%)**
Allergic contact dermatitis	5 (29.4%)
Irritant contact dermatitis	12 (70.6%)

Table 2 Distribution of clinical manifestation

Clinical Manifestation	**n**
Erythematous macules	7
Papules	5
Pustules	1
Squama	11

One subject may present more than one clinical manifestation.

Table 3 Distribution of symptoms

Clinical Manifestation	**n**
Redness	5
Itchiness	7
Dry skin	10
Scaly skin	1
Burning sensation	2
Skin tightness	6

One subject may experience more than one symptom.

Table 1 shows that ICD was the most prevalent type of CD in SMAN 3 Kenjeran female students. This finding differs from a retrospective study on CD patients in RSUD Dr. Soetomo in 2021 by Ginting et al. [2], who found that ACD is more prevalent. This difference may be attributed to the difference in population characteristic. The population in the study conducted by Ginting et al. were all CD patients in RSUD Dr. Soetomo from January 2018 to December 2019, which consisted mostly of females who work in office jobs and housewives. Differences in age group and occupation may affect the types of substance to which individuals are exposed [1]. The difference in skin properties in adolescents and adults may also affect the type of reaction that is more prone to happening. According to Patil and Maibach [8], children are more prone to irritants due to a thinner skin barrier.

Table 2 shows that the most common clinical manifestation was squama. This differs from the findings of Ginting et al. [2], who reported that the most prevalent clinical manifestation was erythematous macules and papules. This finding also differs from the research of Rubianti and Prakoeswa [3], who found that the most prevalent clinical manifestation was erythematous macules, followed by papules and squama.

Table 3 shows that the most prevalent symptom was dry skin, followed by itchiness and skin tightness. This finding is similar to those of Rubianti and Prakoeswa [3], who found that the most prevalent symptoms were itchiness and skin tightness. This finding is also similar to the findings of Miftah et al. [9], who found that the most prevalent symptom was itchiness.

Difference in clinical manifestations may also be influenced by the difference in causative substances. In this research, as shown in Table 9, the most common cause of CD was found to be facial washes. Improper usage of facial wash or product incompatibility may cause trans epidermal water loss (TEWL) which may present as skin dryness, tightness, or dry patches [1].

3.2. Cosmetics and Skin Care Usage in Female Adolescents

In this research, cosmetics and skin care usage was determined by the subject's self report in a written questionnaire.

Table 4 Distribution of cosmetics and skin care usage

Cosmetic and Skin Care Usage	n (%)
Use both cosmetics and skin care	72 (96.0%)
Uses only skin care	1 (1.3%)
Uses only cosmetics	0 (0.0%)
Uses neither	1 (1.3%)

Table 5 Distribution of product type used by subjects

Product	n
Foundation	48
Powders	67
Blush	33
Mascara	37
Eye liner	26
Eye shadow	27
Lip makeup	64
Facial wash	72
Specialized facial wash	61
Spot treatment	31

Exfoliation products	25
Serum	34
Toner	39
Sunscreen	59
Lip moisturizer	65
Facial masks	33
Facial moisturizer	51

One subject may use more than one product.

Table 6 Distribution of the most common usage frequencies for each product

Product	**Most Common Usage Frequency Per Day in Subjects with CD**	**Most Common Usage Frequency Per Day in Subjects without CD**
Foundation	2	1
Powders	1	2
Blush	1	1
Mascara	1	1
Eye liner	1	1
Eye shadow	1	1
Lip makeup	>3	>3
Facial wash	2	2
Specialized facial wash	1	1
Spot treatment	1	1
Exfoliation products	1	1
Serum	1	2
Toner	1, 2	2
Sunscreen	2	2
Lip moisturizer	2	>3
Facial masks	1	1
Facial moisturizer	1, 2	2

One subject may use more than one product.

This research found that nearly all subjects used both cosmetics and skin care products. Table 5 shows that the most commonly used products among the subjects of this research were facial washes, powders, lip moisturizer, and lip makeup.

Table 6 shows that the usage frequency among subjects with CD and subjects without CD was largely similar. However, most subjects without CD were found to use lip moisturizers and serums more frequently compared to subjects with CD. It is also found that the number of subjects with contact dermatitis who used toners and facial moisturizers were equally divided between using them at the frequency of once per day and twice per day. This frequency is slightly lower compared to subjects without CD, who mostly used toners and facial moisturizers twice per day. Difference in

moisturizing habits may affect the occurrence of CD. Lack of moisturization may lead to dry skin which increases the risk of irritation [7].

3.3. History of Contact Dermatitis Due to Cosmetics and Skin Care

In this research, history of CD was established by whether or not the subject reported having experienced symptoms relating to CD after using cosmetics or skin care. Determination of the type of CD was based on the suspected causative substance.

Table 7 History of contact dermatitis

History of CD	Subjects with CD (17)	Subjects without CD (52)	Total (74)
Yes	11 (64.7%)	40 (76.9%)	51 (68.9%)
No	6 (35.3%)	13 (23.1%)	23 (31.1%)

Table 8 Distribution of history of contact dermatitis types

Type of CD	Subjects with CD (17)	Subjects without CD (52)	Total (74)
ACD	2 (11.8%)	13 (25.0%)	15 (20.0%)
ICD	1 (5.9%)	16 (30.8%)	17 (22.7%)
Both	8 (47.1%)	11 (21.1%)	19 (25.3%)

Table 9 Total number of CD symptoms reported after product usage

Product	n
Foundation	14
Powders	9
Blush	7
Mascara	6
Eye liner	5
Eye shadow	6
Lip makeup	15
Facial wash	28
Specialized facial wash	14
Spot treatment	7
Exfoliation products	12
Serum	6
Toner	7
Sunscreen	11
Lip moisturizer	6
Facial masks	14
Facial moisturizer	12

One subject may experience more than one symptom and use more than one product.

This research found that, in general, most of the subjects had a history of contact dermatitis caused by cosmetics or skin care. According to literature, a previous history of contact dermatitis may increase the risk of reoccurrence [1]. However, in this research, the majority of both subjects with CD and subjects without CD experienced CD symptoms after using cosmetics or skin care.

Table 9 shows that the type of product that caused the most symptoms was facial wash, followed by lip makeup, facial masks, foundation, and specialized face washes. This finding is similar to the findings of Rubianti and Prakoeswa [3], who found that the most common etiology of ACD was sunscreen, night cream, powder, and facial wash**.** It is also similar to the findings of Miftah et al. [9], who found that facial care products and facial makeup were the most common etiology of CD. Colorants, fragrance and preservatives are causative substances that are often added into these products [1]**.**

3.4. History of Atopy

In this research, history of atopy was established by whether or not the subject reported having experienced symptoms relating to atopy.

Table 10 History of atopy

History of Atopy	Subjects with CD (17)	Subjects without CD (52)	Total (74)
Yes	7 (41.2%)	18 (34.6%)	25 (33.3%)
No	10 (58.8%)	34 (65.4%)	49 (66.7%)

Table 11 Distribution of history of atopy types

Type of Atopy	Subjects with CD (17)	Subjects without CD (52)	Total
Atopic Dermatitis	6	7	13
Allergic Rhinitis	1	11	12
Atopic Conjunctivitis	0	3	3
Asthma	1	0	1

One subject may have more than one atopy

This research found that most subjects did not have any history of atopy. The proportion of subjects with atopy was slightly higher among subjects with CD compared to subjects without CD. The most common type of atopy reported among subjects with CD was atopic dermatitis, while for subjects without CD, the most common type of atopy reported was allergic rhinitis. A history of atopic dermatitis may affect the permeability of the skin barrier and cause increased risk for CD [10].

4. Conclusion

The results of this study indicate that cosmetics and skin care usage in female adolescents may cause CD, and the type of CD and its' manifestations that are most commonly found are affected by products that are most used. History of contact dermatitis affects both subjects with CD and subjects without CD, and history of atopic dermatitis is more common in subjects with CD. This study indicates that most female adolescents have a history of CD caused by cosmetics and skin care, so education regarding skin health may be beneficial in preventing more cases. This study is hoped to inspire future studies in the same field in order to increase the quality of skin health among female adolescents.

Compliance with ethical standards

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Disclosure of Conflict of interest

This research has no conflicts of interest.

Statement of ethical approval

This research was done after receiving ethical approval from KEPK FK UNAIR, with the ethical exemption number No. 37/EC/KEPK/FKUA/2024.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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