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ORIGINAL RESEARCH

A Case-Control Study Exploring the Association Between Cosmetic Use and Acne Risk: Implications for Prevention and Clinical Practice

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Background: Acne cosmetica refers to acne breakouts caused by cosmetics. Various factors within cosmetics can contribute to the occurrence of acne cosmetica. However, there is a lack of epidemiological surveys on the risk of acne caused by comedogenicity ingredients in cosmetics. This research seeks to examine the correlation between the cosmetics usage and the incidence of acne by focusing on three key factors: the kind of cosmetic exposure, the cosmetic exposure index, and the usage of cosmetic containing comedogenicity ingredients.

Methods: We collected information from 151 participants in the case-control study who answered a self-administered questionnaire about cosmetics assessment. Participants were evaluated based on their cosmetic usage and exposure.

Results: Our findings indicated that facial cleansers (P=0.04), foundation (P=0.03), and powders (P=0.01) were related with an increased risk of acne, with the impact ranking from greatest to least as facial cleansers > powders > foundation. When adjusting for variables such as age, occupation, parental history of acne, and the milk consumption, only the usage of powders remained a significant risk factor for acne [OR (95% CI): 3.47 (1.58–7.59), P=0.02]. Additionally, moisturizers were identified as independent risk factors for acne, with a higher usage dose correlating with an increased risk [OR (95% CI): 1.03 (1.01–1.05), P=0.03]. Furthermore, facial cleansers containing comedogenic ingredients were also discovered to be an independent risk factor for acne [OR (95% CI): 2.49 (1.23–4.90), P=0.01].

Conclusion: Certain cosmetic products may elevate the risk of developing acne, with risk levels influenced by both the dosage of the products and their specific ingredients.

Keywords: acne, acne cosmetica, cosmetics, case-control study, comedogenicity ingredients

Introduction

Globally, acne is the most prevalent inflammatory skin disease. According to statistics, there were 79.7 million instances of acne vulgaris worldwide in 1990, and there were 117.4 million cases in 2019—an increase of 133.7%.[1] Except for the United States, Poland, Germany, and New Zealand, all nations and regions are experiencing a progressive rise in the prevalence of acne vulgaris.[1] Acne is more common in women than in men, and women are also more prone to have comorbid conditions related to acne vulgaris, which increases their risk of serious depression and suicide.[2–4]

Epidemiological studies have identified cosmetics as a significant risk factor for acne, particularly among young women.[5,6] Acne caused by cosmetics was first identified as "Acne Cosmetica" by Kligman et al in 1972 when they noticed that specific chemicals in cosmetics caused chronic acne in women but not in men at that age.[7] In later studies, it was found that cosmetic substances suspected of causing acne were present in both rabbit ear models[8–10] and human models,[11,12] proving that some cosmetics containing comedogenicity ingredients can indeed cause acne to appear.

A case-control study that demonstrated that specific individual cosmetic categories, such as powder, foundation and facial pack, were risk factors for postpubertal acne and that overall cosmetic exposure was negatively and dose-dependently associated with postpubertal acne validated the dose-exposure relationship between acne and cosmetics.[13] Another cross-

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sectional analysis found a positive correlation between frequent cosmetic use and acne severity in female adolescents.[14] The cumulative cosmetic exposure index (CCEI), which quantifies overall cosmetic exposure by multiplying the total duration of use by the frequency of use, was employed to measure each participant's overall cosmetic exposure in both studies.[13,14]

While previous studies have provided valuable insights into the link between cosmetics and acne, they focused more on the effect of the overall cumulative dose of cosmetics on the risk of acne, and there is a lack of prevalence investigations on comedogenicity ingredients cause the risk of acne, especially on Asian. To address this gap, we examined the relationship between cosmetic use and acne appearance from three point of views: the kind of cosmetic exposure, the cosmetic exposure index, and the usage of cosmetics containing comedogenicity ingredients.

Materials and Methods

Study Design

The case-control study included 151 female participants (81 acne patients and 70 controls) who were randomly selected from the dermatology department of Sun Yat-sen Memorial Hospital, Sun Yat-sen University, between October 2022 and April 2023 and who used cosmetics. The selection criteria for the case group included female patients with current acne lesions on the face and the use of cosmetics; patients with trunk acne only and men were excluded. The control group was selected from female patients with no current facial acne lesions and cosmetic use. A self-administered questionnaire was utilized to gather information, like the demographic information, kind of cosmetics, dosage, and product name in the past 28 days. After gathering Comedogenicity ingredients from the literature, the Comedogenicity Ingredients List (Table S1) was created.[9–12,15,16] If the ingredients were on the Comedogenicity Ingredients List, the top 10 ingredients in the ingredient list of the products used by the respondents were deemed to contain comedogenicity ingredients. Cosmetics are divided into three subcategories, (1) Makeup products: Primers, Concealer, Foundation, Blush, Eyeshadow, Powders, Sunscreens, (2) Skin care products: Toners, Serum, Moisturizers, (3) Facial cleansing products: Facial cleanser, Makeup remover. Utilizing the standard cosmetic exposure index (CEI) described in the literature, the dosages of each type of cosmetic were assessed. CEI for each type of cosmetic product was calculated by taking into account how frequently each cosmetic product was used over the course of 28 days. By counting the name of the cosmetic product used by the responder, the presence of comedogenicity substances in the ingredient list of a cosmetic product was examined. All comedogenicity ingredients had previously been verified in rabbit ear tests. The specific flowchart can be seen in Figure 1.

Cosmetic Exposure Index

To digitally quantify exposure to cosmetics, previous literature has established a Cosmetic Exposure Index (CEI).[13] This index accounts for both the duration of use (day) for specific cosmetic products or beauty care practices and their frequency (day) of application. In calculating the index, the total daily duration of use for a given cosmetic product is multiplied by its daily frequency of use. This index reflects an individual's usage of a particular cosmetic product over the most recent 28-day period. Furthermore, we computed a Cumulative Cosmetic Exposure Index (CCEI) for each individual by summing the exposure indices across different categories of cosmetic products they used.

Statistical Analysis

Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) for Windows, version 26.0 (SPSS Inc., Chicago, IL, USA). Demographic information, family history, dietary habits, and cosmetic-related data were compared between the acne (Patients) and non-acne (Controls) groups. Continuous variables were analyzed using nonparametric tests (Mann–Whitney *U*-test). Categorical variables were analyzed using Pearson's chi-square test or Fisher's exact test as appropriate. Univariate and multivariate logistic regression analyses were used to separately assess the relationship between the kind of cosmetics, cosmetic exposure index, or usage of comedogenic ingredients and the risk of acne. Significant and deemed important at baseline were all utilized as correction factors for the multivariate regression model. The common concurrent use of multiple makeup products (eg, different eyeshadow palettes applied together), coupled with the potential for recall bias when participants report usage of multiple items simultaneously, precluded a reliable investigation into the association between the cosmetic exposure index, comedogenic ingredients in makeup products, and the risk of acne occurrence. Therefore, these associations were not examined in this study.

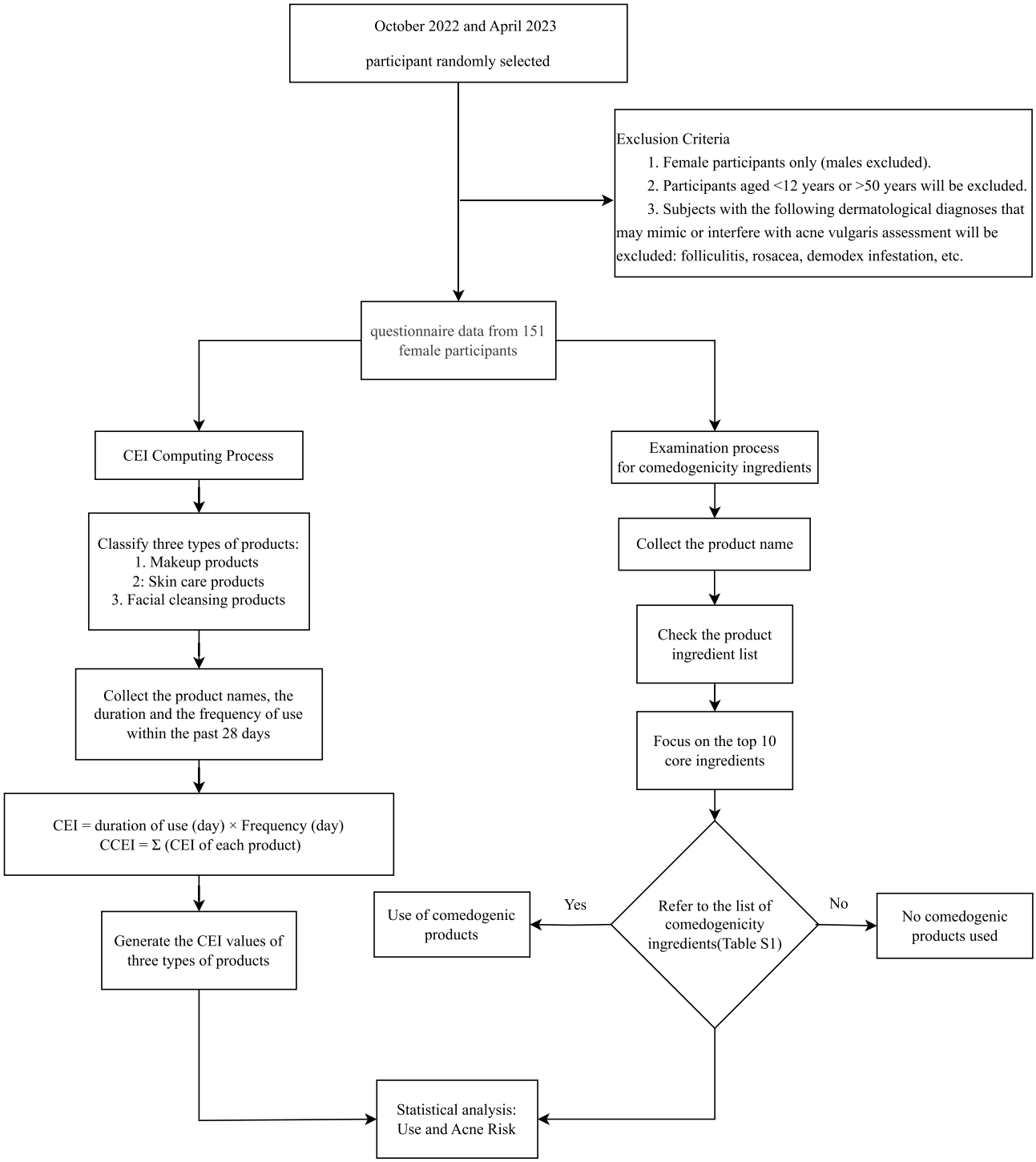

Figure 1 Study Design Flowchart.

Results

Patient Characteristics

The distribution of demographic data, family history, and dietary habits among the population surveyed is shown in Table 1. About 66.9% of the participants were over the age of 25, compared to 31.8% in the control group and 35.1% in the patient group. About 47.0% of the patients against 35.1% of controls were of normal weight (18.5≤BMI<24), making

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Table 1 Demographic General Characteristics, Family History, and Eating Habits According to Their Case-Control Status

		Group		*P* value
	Total (N=151) n (%)	**Controls n (%)**	**Patients n (%)**	
Age, y				
<25	50 (33.1)	22 (14.6)	28 (18.5)	0.68
≥25	101 (66.9)	48 (31.8)	53 (35.1)	
BMI, kg/m²				
BMI<18.5	16 (10.6)	11 (7.3)	5 (3.3)	0.12
18.5≤BMI<24	124 (82.1)	53 (35.1)	71 (47.0)	
BM≥24	11 (7.3)	6 (4.0)	5 (3.3)	
Income, RMB/years				
>150,000	64 (42.4)	31 (20.5)	33 (21.9)	0.36
80,000–150,000	58 (38.4)	29 (19.2)	29 (19.2)	
<80,000	29 (19.2)	10 (6.6)	19 (12.6)	
Education				
High school or below	17 (11.3)	6 (4.0)	11 (7.3)	0.22
Bachelor	59 (39.1)	24 (15.9)	35 (23.2)	
Graduate or above	75 (49.7)	40 (26.5)	35 (23.2)	
Occupation				
Professionals (teachers/doctors/lawyers)	56 (37.1)	32 (21.2)	24 (15.9)	0.02
Workers and service industry personnel	18 (11.9)	4 (2.6)	14 (9.3)	
Students	53 (35.1)	27 (17.9)	26 (17.2)	
Unemployed or other	24 (15.9)	7 (4.6)	17 (11.3)	
Marital status				
Married	105 (69.5)	50 (33.1)	55 (36.4)	0.64
Unmarried	46 (30.5)	20 (13.2)	26 (17.2)	
Paternal family history				
Yes	21 (13.9)	5 (3.3)	16 (10.6)	0.03
No	130 (86.1)	65 (43.0)	65 (43.0)	
Maternal family history				
Yes	21 (13.9)	5 (3.3)	16 (10.6)	0.03
No	130 (86.1)	65 (43.0)	65 (43.0)	
Parental family history				
Yes	48 (31.8)	18 (11.9)	30 (19.9)	0.14
No	103 (68.2)	52 (34.4)	51 (33.8)	
Milk, days/week				
≤5	80 (53.0)	31 (20.5)	49 (32.5)	0.048
>5	71 (47.0)	39 (25.8)	32 (21.2)	
Fried greasy food, days/week				
≤5	124 (82.1)	60 (39.7)	64 (42.4)	0.28
>5	27 (17.9)	10 (6.6)	17 (11.3)	
Spicy food, days/week				
≤5	93 (61.6)	48 (31.8)	45 (29.8)	0.10
>5	58 (38.4)	22 (14.6)	36 (23.8)	

up 82.1% of the population. About 49.7% of respondents had graduate degrees or above, 69.5% were married, and 42.4% of respondents reported having an annual income of more than 150,000 RMB, which was no significant difference was observed between the two groups. The occupational distribution differed between the case and control groups, with a higher proportion of students in the case group and a higher proportion of professionals in the control group. The occupational distribution differed significantly between the two groups ($P<0.05$). With a significant between-group difference ($P=0.03$), the proportion of first-degree relatives with an acne history among the analyzed acne family history was 13.9%, 13.9%, and 31.8% for fathers, mothers, and siblings, respectively. However, this finding was only significant for parents. In terms of dietary habits, milk consumption was significantly different between the two groups ($P<0.05$). The proportion of fried greasy and spicy foods consumed more than five times a week was 17.9% and 38.4%, respectively, and the difference between cases and controls did not reach the level of significance.

The Relationship Between the Kind of Cosmetic Exposure and Acne Risk

The kind of cosmetic exposure and acne risk, overall and stratified by case or control status, is shown in Table 2. In terms of Facial cleanser, the usage rate in the case group was 51.0%, which was higher than the one of the control group (39.1%), and the results showed a significant difference between the two groups in terms of whether they used Facial cleanser or not

Table 2 Distribution of Subjects According to Cosmetics Use and Acne Risk

	Group			*P* value
	Total (N=151) n (%)	**Controls n (%)**	**Patients n (%)**	
Facial cleanser				0.03
Use	136 (90.1)	59 (39.1)	77 (51.0)	
Not use	15 (9.9)	11 (7.3)	4 (2.6)	
Toners				0.29
Use	128 (84.8)	57 (37.7)	71 (47.0)	
Not use	23 (15.2)	13 (8.6)	10 (6.6)	
Serum				0.75
Use	82 (54.3)	39 (25.8)	43 (28.5)	
Not use	69 (45.7)	31 (20.5)	38 (25.2)	
Moisturizers				0.53
Use	124 (82.1)	56 (37.1)	68 (45.0)	
Not use	27 (17.9)	14 (9.3)	13 (8.6)	
Makeup remover				0.05
Use	69 (45.7)	26 (17.2)	43 (28.5)	
Not use	82 (54.3)	44 (29.1)	38 (25.2)	
Primers				0.16
Use	61 (40.4)	24 (15.9)	37 (24.5)	
Not use	90 (59.6)	46 (30.5)	44 (29.1)	
Concealer				0.88
Use	31 (20.5)	14 (9.3)	17 (11.3)	
Not use	120 (79.5)	56 (37.1)	64 (42.4)	
Foundation				0.03
Use	62 (41.1)	22 (14.6)	40 (26.5)	
Not use	89 (58.9)	48 (37.1)	41 (27.2)	

(*Continued*)

Table 2 (Continued).

	Group			*P* value
	Total (N=151) n (%)	**Controls n (%)**	**Patients n (%)**	
Blush				0.24
Use	46 (30.5)	18 (11.9)	28 (18.5)	
Not use	105 (69.5)	52 (34.4)	53 (35.1)	
Eyeshadow				0.14
Use	41 (27.2)	15 (9.9)	26 (17.2)	
Not use	110 (72.8)	55 (36.4)	55 (36.4)	
Powders				0.01
Use	44 (29.1)	13 (8.6)	31 (20.5)	
Not use	107 (70.9)	57 (37.7)	50 (33.1)	
Sunscreens				0.64
Use	66 (43.7)	32 (21.2)	34 (22.5)	
Not use	85 (56.3)	38 (25.2)	47 (31.1)	

(*P*=0.03). The rate of Foundation use in the case group was 26.5%, which was higher than that of the control group (14.6%), and there was a significant difference in Foundation use between the two groups (*P*=0.03). In terms of Powders, the usage rate was 20.5% and 8.6% in the case and control groups, respectively, with a significant difference between the two groups (*P*=0.01). Other kinds of cosmetics are without any significant between-group differences.

All types of cosmetics were logistically regressed, shown in Table 3. The results of the one-way logistic regression showed that the usage of Facial cleanser, Foundation, and Powders were risk factors for acne in both groups of respondents. The impact of each cosmetic kind on acne was ranked as follows: facial cleanser (OR: 3.59), powders (OR: 2.86), and foundation (OR: 2.13). After adjusting for age, occupation, parental history of acne, and milk consumption using multifactorial logistic regression, only powder use significantly raised the risk of acne [OR (95% CI): 3.47 (1.58–7.59), *P*=0.02]. The use of powders was independently associated with a 3.47 times higher risk of developing acne.

Table 3 Univariate and Multivariate Analyses of Association Between Cosmetics Use and Acne Risk

	Univariate Analysis		Multivariate Analyses	
	OR (95% CI)	***P* value**	**OR (95% CI)**	***P* value**
Facial cleanser	3.59 (1.09–11.84)	0.04		
Toners	1.62 (0.66–3.96)	0.29		
Serum	0.90 (0.47–1.71)	0.75		
Moisturizers	1.31 (0.57–3.01)	0.53		
Makeup remover	1.92 (1.00–3.68)	0.05		
Primers	1.61 (0.83–3.12)	0.16		
Concealer	1.06 (0.48–2.35)	0.88		
Foundation	2.13 (1.09–4.15)	0.03		
Blush	1.53 (0.75–3.09)	0.24		
Eyeshadow	1.73 (0.83–3.62)	0.14		
Powders	2.86 (1.35–6.06)	0.01	3.47 (1.58–7.59)	0.02
Sunscreens	0.86 (0.45–0.64)	0.64		

The Relationship Between the Cosmetic Exposure Index and Acne Risk

The cumulative cosmetic dose profile was non-normally distributed, as shown in Table 4, and a Mann–Whitney *U*-test analysis was carried out to check if there was a significant difference in the dosages of facial cleanser and moisturizer applied between the two groups. Table 5 shows the results of the cosmetic exposure index logistic regression analysis. The unadjusted univariate analysis showed that participants in the current case group used significantly higher doses of Facial cleanser [OR (95% CI): 1.03 (1.04–1.06); *P*=0.02], Moisturizers [OR (95% CI): 1.03 (1.01–1.06); *P*=0.02], all risk factors for acne development. After adjustment, the dose of Moisturizers used [OR (95% CI): 1.03 (1.01–1.06); *P*=0.03] was found to be independently related with acne.

The Relationship Between the Usage of Cosmetics Containing Comedogenicity Ingredients and Acne Risk

The statistical analysis results demonstrating the association between the usage of cosmetics containing comedogenic ingredients and the incidence of acne are presented in Tables 6 and 7. In contrast to the 40% of the control group, 61.7% of people with acne used facial cleansers with comedogenicity ingredients, indicating a significant difference between the two groups (*P*=0.01). A substantial difference between the two groups was seen in the data, with 43.2% of acne patients using moisturizers that contained substances that cause acne, significantly larger than the 27.1% of the control group (*P*=0.04). Our investigation identified lauric acid and stearic acid as the predominant comedogenic ingredients in facial cleansers. In moisturizers, glyceryl stearate was found to be the most frequently identified comedogenic ingredient.

Unadjusted univariate analysis indicated that using facial cleansers with comedogenic ingredients was a risk factor for acne [OR (95% CI): 2.42 (1.26–4.66); *P*=0.01]. This association remained significant after adjustment, showing that facial cleansers containing comedogenic ingredients were independently linked to acne occurrence [OR (95% CI): 2.49 (1.23–4.90); *P*=0.01].

Table 4 Distribution of Subjects According to Cosmetic Exposure Index

	Group			*P* value
	Total (N=151) M (IQR)	Controls M (IQR)	Patients M (IQR)	
Facial cleanser	28.00 (28.00–56.00)	28.00 (28.00–28.00)	28.00 (28.00–56.00)	0.02
Toners	56.00 (28.00–56.00)	56.00 (28.00–56.00)	56.00 (28.00–56.00)	0.86
Serum	28.00 (28.00–56.00)	28.00 (28.00–56.00)	28.00 (28.00–56.00)	0.61
Moisturizers	56.00 (28.00–56.00)	28.00 (28.00–56.00)	56.00 (28.00–56.00)	0.02
Makeup remover	11.00 (1.00–28.00)	19.00 (4.00–28.00)	7.00 (4.00–23.50)	0.45

Table 5 Univariate and Multivariate Analyses of the Cosmetic Exposure Index

	Univariate Analysis		Multivariate Analyses	
	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Facial cleanser	1.03 (1.04–1.06)	0.02		
Toners	1.00 (0.97–1.02)	0.87		
Serum	1.01 (0.98–1.04)	0.63		
Moisturizers	1.03 (1.01–1.06)	0.02	1.03 (1.01–1.06)	0.03
Makeup remover	1.01 (0.97–1.06)	0.60		

Table 6 Distribution of Subjects According to Comedogenicity Ingredients in Cosmetics and Acne Risk

		Group		*P* value
	Total (N=151) n (%)	Controls n (%)	Patients n (%)	
Facial cleanser				0.01
Use	78 (51.7)	28 (40.0)	50 (61.7)	
Not use	73 (48.3)	42 (60.0)	31 (38.3)	
Toners				0.76
Use	14 (9.3)	6 (8.6)	8 (9.9)	
Not use	137 (90.7)	64 (91.4)	73 (90.1)	
Serum				0.8
Use	10 (6.6)	6 (8.6)	4 (4.9)	
Not use	141 (93.4)	64 (91.4)	77 (95.1)	
Moisturizers				0.04
Use	54 (35.8)	19 (27.1)	35 (43.2)	
Not use	97 (64.2)	51 (72.9)	46 (56.8)	
Makeup remover				0.11
Use	30 (19.9)	10 (14.3)	20 (24.7)	
Not use	121 (80.1)	60 (85.7)	61 (75.3)	

Table 7 Univariate and Multivariate Analyses of Comedogenicity Ingredients in Cosmetics and Acne Risk

	Univariate Analysis		Multivariate Analyses	
	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Facial cleanser	2.42 (1.26–4.66)	0.01	2.49 (1.23–4.90)	0.01
Toners	1.17 (0.39–3.55)	0.78		
Serum	0.55 (0.15–2.05)	0.38		
Moisturizers	2.04 (1.03–4.06)	0.41		
Makeup remover	0.50 (0.12–2.17)	0.36		

Discussion

Previous studies have identified that certain cosmetics can elevate the risk of acne, which our research corroborated, highlighting significant differences in the use of facial cleansers, foundations, and powders between the two groups. Univariate logistic regression analysis demonstrated a positive association between these cosmetic products and the risk of developing acne (ORs>1). After adjusting for age, occupation, parental history of acne, and milk consumption, a significant link was found between powder use and an increased risk of acne in females, showing a 3.47-fold higher risk compared to non-users. Acne is an inflammatory condition involving the hair follicles and sebaceous glands, believed to be driven by factors such as excessive sebum production, alterations in sebum composition, and the formation of funnel cysts.[17] On one hand, when powder combines with sebum or moisture on the skin, it can clump together, blocking the hair follicles and sebaceous glands, preventing sebum from being discharged and leading to the occurrence of acne.[18] On the other hand, to absorb excess oil from the skin, talc and kaolin are commonly added to most foundations and powders.[19] Excessive absorption of skin oil can disrupt the skin's oil-water balance,[20] stimulating the sebaceous glands to produce more sebum, thereby exacerbating acne.

Literature has found that high cosmetic usage may increase the severity of acne.[14] Our article, by analyzing the usage dosage of each type of cosmetic, found that: the dose of moisturizers used is an independent risk factor for the risk of acne, and the higher the dose of such products used the higher the risk of acne. This is due to the fact that moisturizers

produce a barrier-repair environment by introducing occlusive moisturizing ingredients like petrolatum, mineral oil, paraffin, and squalene to the skin's surface to form a film of varying thicknesses, and the thicker film can obstruct sebum drainage and keratin buildup, which can aggravate acne.[21] A clinical trial suggests that the highly hydrated state that moisturisers induce in the skin may increase its permeability to hydrophilic substances such as Sodium Lauryl Sulphate (SLS),[22] which are frequently included in cleaning products, have the potential to penetrate the skin and cause persistent irritation and inflammation if they are not completely removed after use.

In this study, the presence of comedogenic ingredients in facial cleansers was found to be independently associated with the risk of acne, with the risk of acne being 2.49 times higher in facial cleansers containing comedogenic ingredients than in those without. Kligman concluded that cosmetic products containing comedogenic ingredients are a cause of acne, whilst experiments using rabbit[8–10] and human[11,12] models of comedogenicity substances like lauric acid, stearic acid, sulfated castor oil and ethoxylated lanolin further supported the existence of acne Cosmetica. However, following the ban on rabbit-ear experiments on cosmetic ingredients, experiments on the comedogenic properties of cosmetic ingredients stopped in 2007, and it remains to be confirmed whether products with comedogenic ingredients lead to the development of acne. In the past, dermatologists have often argued that frequent washing of the face may cause acne, but in one study, washing high frequency (four times a day) with a mild facial cleanser (Neutrogena Fresh Foaming Cleanser) did not dramatically worsen acne.[23] Our study identified lauric acid and stearic acid as the most prevalent comedogenic ingredients in facial cleansers. These anionic surfactants, while commonly used as primary cleansing agents, have demonstrated significant potential for skin irritation and barrier disruption.[24] Among surfactant classes, anionic types (including these fatty acid derivatives) exhibit the most pronounced irritancy, which may contribute to acne pathogenesis through multiple mechanisms: by damaging the skin barrier, promoting abnormal follicular keratinization, and accelerating keratinocyte exfoliation.[7,25] This cascade can lead to occlusion of pilosebaceous ducts with excess keratin, thereby increasing acne risk. Based on these findings, we recommend avoiding facial cleansers containing these anionic surfactants in favor of milder alternatives. Amphoteric surfactants (eg, cocamidopropyl betaine) present a preferable option due to their reduced irritancy potential while maintaining effective cleansing properties.[24]

This study introduces a novel dual-dimensional approach that innovatively combines CEI with comedogenic ingredient analysis, advancing beyond previous CEI only research to establish a more comprehensive cosmetics-acne risk assessment framework. While this methodology enables more precise identification of high risk product combinations and personalized prevention strategies, its findings should be interpreted considering certain limitations, including potential confounding from concurrent product use, single-center sampling that may limit generalizability, and did not stratify acne outcomes by severity (eg, mild, moderate, or severe) verity analysis that could mask grade specific effects all of which highlight important directions for future multicenter studies with detailed exposure tracking and clinical stratification.

This study demonstrates that prolonged use of moisturizers with higher CEI significantly elevates the risk of acne cosmetica, with observable manifestations typically occurring within 28 days. Consequently, clinicians should advise patients to: (1) immediately discontinue any moisturizer that triggers new acne lesions or exacerbates existing acne within this 28-day window; (2) prioritize non-comedogenic formulations; (3) ensure complete rinsal of cleansers, especially in high-retention areas like the hairline and jawline. These evidence-based protocols collectively address both product selection and application techniques to mitigate pore occlusion while maintaining skin barrier integrity.

Conclusion

Our study provides important information regarding the selection of appropriate cosmetic products to prevent or reduce the risk of acne. This study suggests that cosmetic products may increase the risk of acne development, especially with facial cleansers containing anionic surfactants, and that there is a dose-effect relationship between the effects of cosmetic dose on acne development. Thus, we advise patients to carefully choose proper products, controlling the amount of cosmetics used. In actual clinical work, we should also pay attention to the influence of other factors on the development of acne and develop an individualized treatment plan.

Ethics Statement

This study was reviewed and approved by the Institutional Review Ethics Committee of Sun Yat-sen Memorial Hospital, Sun Yat-sen University (Approval No. SYSKY-2023-230-01) in compliance with Declaration of Helsinki guidelines. Prior to participation, written informed consent was obtained from all study participants.

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Disclosure

The authors declare no conflicts of interest in this work.

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