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Cosmetic application behaviours and their association with sensitive skin in young adult women

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ABSTRACT

Background: Sensitive skin is an uncomfortable sensation on the skin that arises due to a response to stimuli that normally do not cause discomfort. Women more commonly experience it than men. Recent evidence indicates that cosmetic use is the predominant triggering factor compared to other factors, particularly in women, due to the extensive and varied use of products.
Objective: This study examined the relationship between the number of cosmetic products used daily and weekly and the incidence of sensitive skin among young adult females.
Methods: This cross-sectional study employed a stratified random sampling method. The study population involved young female adults who agreed to participate after completing the informed consent form. The exclusion criteria were facial inflammation and use of oral or topical medication containing corticosteroids. The cosmetic usage pattern was assessed through a questionnaire. Skin sensitivity assessment was conducted by utilizing the lactic acid stinging test (LAST), where 10% aqueous lactic acid solution was topically applied to the right nasolabial fold region. The mann-whitney test was employed to analyze the relationship between the number of cosmetic products used daily and weekly and the occurrence of sensitive skin.
Results: Out of 136 subjects, 23.5% have sensitive skin based on the LAST. The most prevalent products used by the majority of respondents are facial wash, sunscreen, and moisturizer, with a percentage of >70%. No significant relationship is found between the number of products used daily and weekly and sensitive skin ($p > 0.05$).
Conclusion: No significant differences regarding the number of products used among sensitive and non-sensitive skin groups. Therefore, future studies are needed to explore the ingredients in cosmetic products and their volume of usage, as well as to conduct prospective studies assessing the impact of cosmetic usage patterns on the occurrence of sensitive skin.

INTRODUCTION

Cosmetics are personal care products applied directly to the skin to decorate, protect, and improve appearance.[1] Young women tend to use several cosmetic products more frequently than men. These products are most commonly applied to the face rather than other anatomical areas.[2,3] Studies conducted in multiple countries revealed that most cosmetics users are young adults and females.[4–6] The frequency, duration, and prevalence of cosmetic usage form a pattern that varies

among individuals. This has been studied in various countries such as Saudi Arabia, Korea, Sri Lanka, China, the Netherlands, and Indonesia.[7–12]

Cosmetic industries in Indonesia are currently experiencing rapid development, which marks this country as the fastest-expanding cosmetic market in Asia. Increasing population, health and well-being awareness, along with growing disposable income have contributed to the cosmetic industry's rise.[13] In Indonesia, the number of cosmetic companies has expanded to 23% in 3 years, and more than 700 cosmetic firms are operating in this country.[13,14] This demonstrates that the cosmetic industry can easily thrive in Indonesia.

According to the literature, the pattern of cosmetic use is a risk factor for developing acne vulgaris, dermatitis, and sensitive skin.[11,15,16] Sensitive skin is characterized by an uncomfortable sensation, such as stinging, burning, pain, pruritus, and tingling that arises in response to stimuli that typically normal skin does not feel these sensations.[17] Globally, the prevalence of sensitive skin varies between 41% and 68%.[18] Several factors can trigger sensitive skin, such as temperature, environment, psychological factors, and cosmetics.[19] Women tend to use various types of cosmetic products more frequently than men, making their skin more prone to sensitive skin. A meta-analysis shows that excessive use of cosmetics increases the likelihood of experiencing sensitive skin symptoms.[2,18]

The patterns of cosmetic use correlate with the occurrence of sensitive skin. Thus far, there are only two studies that have examined this topic. These studies found that people who wear cosmetics more frequently experience sensitive skin symptoms . Both studies used questionnaires to diagnose sensitive skin, and both were conducted outside the Southeast Asian Region.[3,16] Within Indonesia specifically, no research has yet been published exploring this relationship. Therefore, this study aims to examine the relationship between cosmetic use and sensitive skin in the Indonesian context.

METHODS

Study design

This cross-sectional study was conducted in the Faculty of Medicine, University of Mataram, from May to June 2023.

Ethics statement

The Medical Ethics Committee, Faculty of Medicine, University of Mataram, granted ethical approval for the study (341/UN18.F8/ETIK/2023). Participants were informed about the study's aims, procedures, potential risks, and benefits before signing an informed consent form.

Study population

The participants were female medical students in their first to fourth year of academic study who were considered as female young adults. At the time of the study, they were free of any symptoms of facial inflammation due to acne vulgaris, rosacea, atopic dermatitis, psoriasis, or skin infections.[20] Those inflammatory conditions, along with other facial skin diseases, were confirmed by a dermatologist. Futhermore, participants taking or using systemic corticosteroids, topical corticosteroids, and systemic or topical antihistamines for 1 week, were excluded. This is based on a study that demonstrated corticosteroid therapy significantly inhibits skin prick test responses for up to 3 days. Consequently, our study utilized a 1-week interval as sufficient time to avoid any interference from the corticosteroid therapy.[21]

The sampling method used was stratified random sampling. The minimum sample size was calculated using the sample size formula to compare two means. Type I and type II errors were set at 5% and 10%, respectively, with an effect size of 4. The combined standard deviation was derived from the standard deviations of the number of cosmetic products used daily by participants with and without sensitive skin, based on a study conducted by Brenaut et al.[3] The minimum sample size required for this study was 88.

Instrument development

Cosmetic usage patterns data were collected through an online questionnaire administered in Bahasa Indonesia, developed based on a literature review. Literature search was conducted in Pubmed and Google Scholar to select relevant articles identifying frequently used cosmetic products among young female adults. The search term used was "cosmetic usage pattern". Research in Indonesia indicates that the majority of respondents primarily use moisturizers, sunscreens, loose powders, and facial cleansers.[9] In contrast, studies from Saudi Arabia highlight lipstick, makeup removers, and eyebrow pencils as the most frequently used items.[10] Consequently, these findings provided the rationale for the selection of the cosmetic product examples in this study. The questionnaire encompassed demographic information and cosmetic usage patterns (types, frequency, and duration of use) for 20 cosmetic products commonly studied in the literature.[7,9,10]

The prevalence of use was determined by the percentage of users who reported using a particular type of product by answering "yes" or "no "questions. Among these 20 products, the questionnaire inquired about the daily usage of 14 products and weekly usage of six products. Participants were asked about their cosmetic usage , including product type, daily frequency of application, and total duration of use. Specific items were included to differentiate between regular daily users and those with intermittent usage patterns over the last six months.

Additionally, the questionnaire inquired about menstrual status (whether participants were currently in or 7 days before the expected period start) and whether they considered the "sensitive skin" label when purchasing cosmetic products.

Instrument validity

Before its use, the questionnaire was evaluated for content validity. This assessment involved a panel of 10 experts, including faculty members with backgrounds in medical, biomedical, and instrument development expertise. The experts rated the relevance and clarity of each item using a 4-point ordinal scale from 1 to 4, with 1 indicating the content was irrelevant, while 4 indicated the content was very relevant. Experts were also invited to provide comments or suggest revisions to the questionnaire. The mean item content validity index (I-CVI), the scale content validity index average (S-CVI/Ave), and the scale content validity index universal agreement (S-CVI/UA) were evaluated to assess the content validity.[22]

In the final version of the questionnaire, I-CVI, S-CVI/Ave, and S-CVI/UA received a score of 1 for relevance. For clarity, the I-CVI was 0.98, the S-CVI/Ave was 0.98, and the S-CVI/UA was 0.83. Considering the cutoff for CVI is at least 0.78, it can be concluded that this questionnaire has demonstrated good content validity.[22]

A lactic acid stinging test (LAST) was performed to determine if the participant had sensitive skin. This test involved applying a 10% lactic acid solution to the right nasolabial fold and a normal saline solution to the left nasolabial fold, each with a different brush.[20] Participants were then asked to rate the reactions on both folds using a scale from 0 to 3 at two time points: 2.5 and 5 minutes after the application. A scale of 0 means no symptoms of sensitive skin; 1 means slight symptoms of sensitive skin; 2 means moderately felt symptoms of sensitive skin; and 3 means strongly felt symptoms of sensitive skin. Reactions such as stinging, burning, and redness were also observed in the right nasolabial area.[20,23]

Data collection

The data were obtained from May to June 2023. The participants were instructed not to use any cosmetics (make-up or skin care products) on their face, including facial wash, for 12 hours before data collection activities. The use of skincare products can affect transepidermal water loss (TEWL), which relates to skin condition. Ingredients such as detergents may damage the skin barrier, while emollients occlude skin layers, thereby reducing TEWL. Therefore, to minimize the cosmetics' impact on respondents' skin condition, a 12-hour interval is required.[24] Participants first completed the questionnaire before undergoing the LAST. Participants who developed erythema, pruritus, or stinging symptoms after application of the lactic acid were categorized as

having sensitive skin. In such cases, the test was discontinued immediately. Participants were instructed to rinse the affected area with running water to alleviate discomfort and then immediately referred to see a dermatologist for further treatment. However, so far, some respondents experienced redness and stinging sensations, but these symptoms disappeared within one hour, and none required treatment from a dermatologist.

Statistical analysis

The data were analyzed using the IBM SPSS version 25 (IBM Corp., Armonk, NY, USA). A univariate statistical test was conducted, and the results were expressed as mean, median, maximum, minimum, and standard deviation for the number of cosmetic products used, the frequency, and the duration of use. The relationship between the number of cosmetic products used daily and sensitive skin was analyzed using a Mann-Whitney Test.

RESULTS

A total of 136 young adult females agreed to participate in the study. Thirty-two of the participants (23.5%) had sensitive skin, based on the LAST. There was no significant difference in menstrual status between those who had sensitive skin and those who had non-sensitive skin. However, this study found a significant difference in participants' age and the occurrence of sensitive skin. The sensitive skin group was more likely to consider purchasing cosmetics labeled "for sensitive skin" compared to the non-sensitive group. Participants' characteristics are presented in Table 1.

Table 1. Research Participants Characteristics

Characteristic	Unit	Skin Condition		p-value
		NSS	SS	
Age (years)	Median (Min–Max)	20 (18–23)	19 (17–21)	0.000
Currently in the menstruation period or 7 days before the expected date of the 1st day of menstruation n (%)	Yes	38 (36.5)	13 (40.6)	0.676
	No	66 (63.5)	19 (59.4)	
Considering the claim 'for SS' when purchasing products n(%)	Always	4 (3.8)	4 (12.5)	0.000019
	Often	12 (11.5)	11 (34.4)	
	Sometimes	24 (23.1)	10 (31.3)	
	Rarely	32 (30.8)	5 (15.6)	
	Never	32 (30.8)	2 (6.3)	
Total		104 (76.5)	32 (23.5)	

NSS: non-sensitive skin; SS: sensitive skin

Figure 1 displays the frequency and percentage of participants who use various cosmetic products daily, weekly, or not at all. Among the fourteen daily-used cosmetic products, facial wash was the most frequently used, with 95% of participants incorporating it into their routine, followed by sunscreen (88%) and lipstick (79%). For the six products used weekly, micellar water stands out as the most commonly used, with 70% of participants including it in their routine.

Figures 2 and 3 illustrate the frequency of cosmetic product usage among participants with non-sensitive and sensitive skin, respectively. The majority of both groups did not use night creams. Besides, toner products were used more by the majority of the non-sensitive skin group (63%) than to the other group (43%).

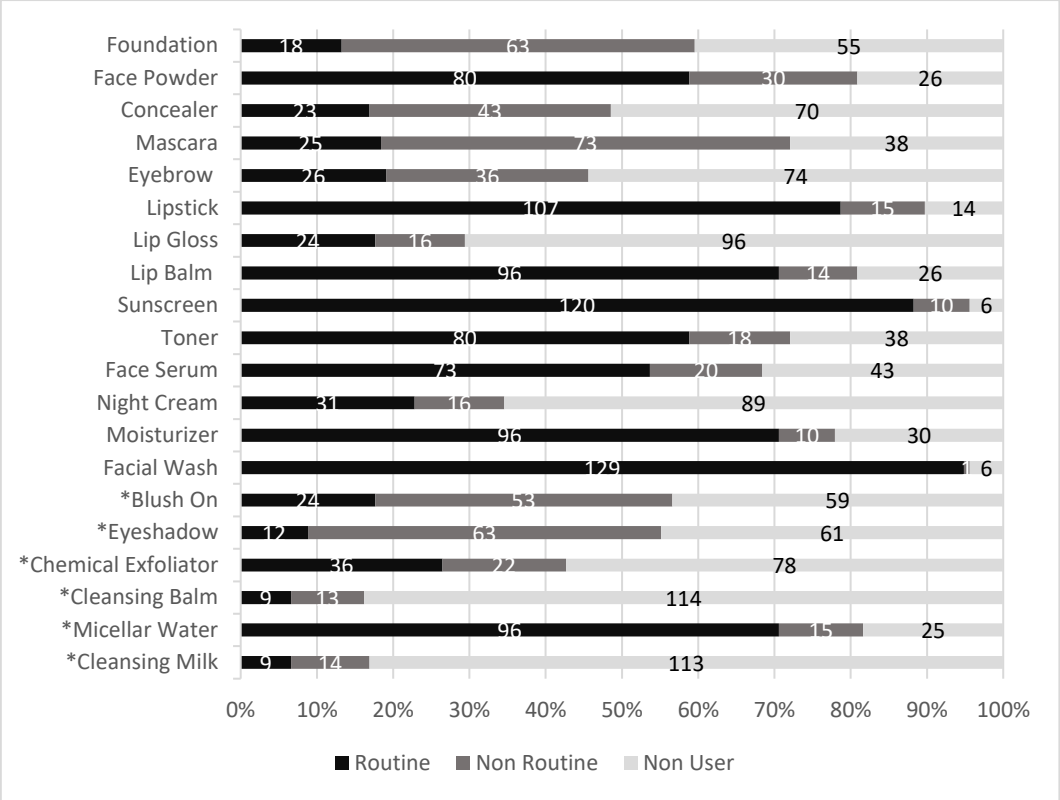

Figure 1. Usage pattern of cosmetic products among participants.
(*) weekly used products

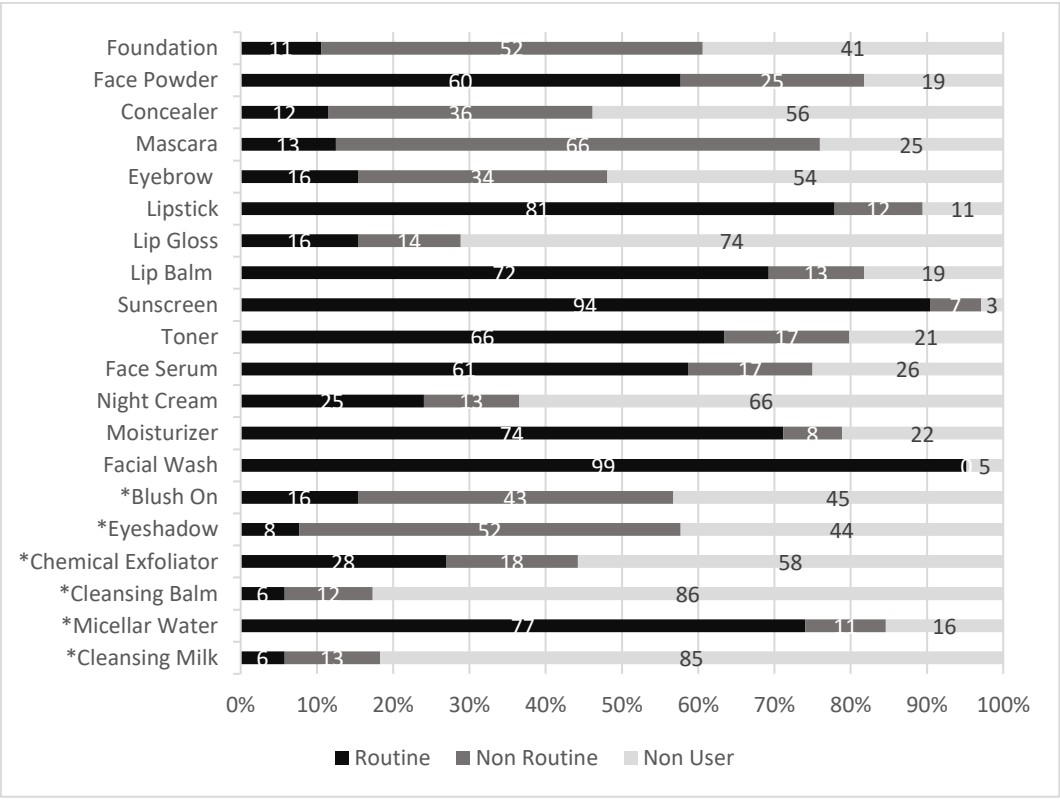

Figure 2. Usage pattern of cosmetic products among participants with non-sensitive skin.
(*) weekly products

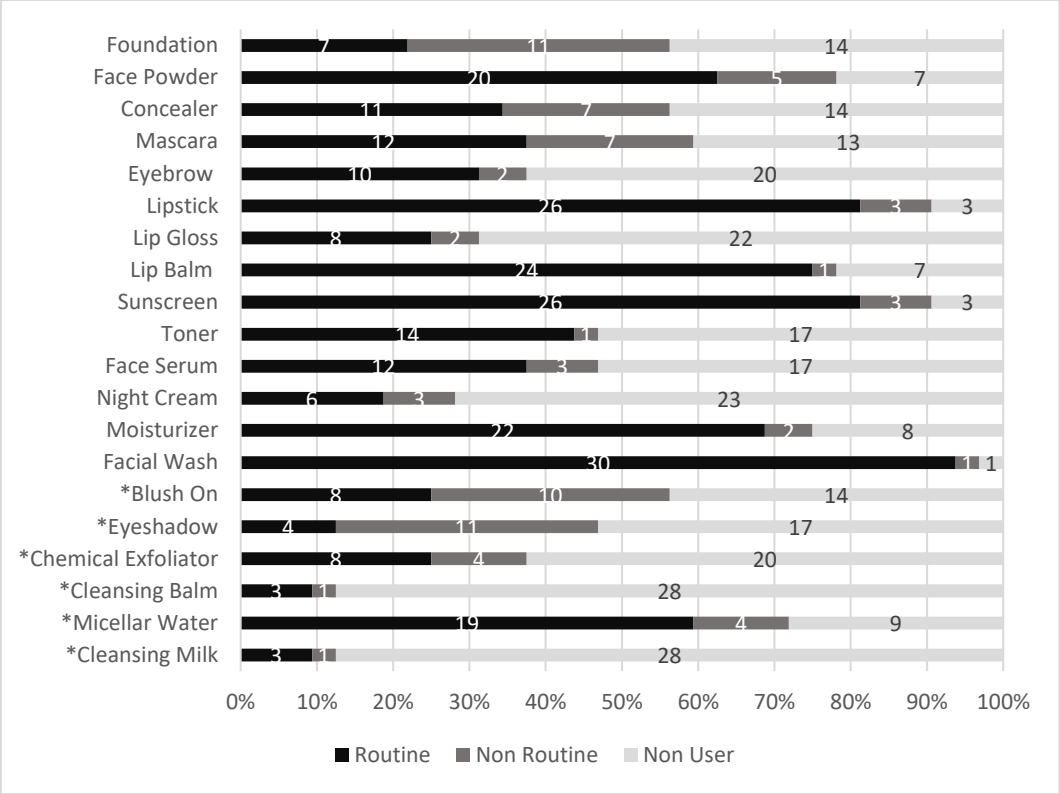

Figure 3. Usage pattern of cosmetic products among participants with sensitive skin. (*) weekly products

Table 2 provides data comparing daily and weekly cosmetic product usage frequency among individuals in non-sensitive and sensitive skin groups. The highest mean frequency is lipstick, with an average usage of 2.19 per day. Sunscreen and all facial skincare products exhibit non-significant frequency differences between the two groups. Regarding weekly products, micellar water shows the highest usage frequency across both groups, while cleansing balm and cleansing milk were the least used products among the respondents. This table's data was calculated by summing up the total frequency of usage (daily or weekly) and dividing it by the number of respondents (in non-sensitive or sensitive skin groups).

Comparisons of the number of cosmetic products used by the non-sensitive skin and sensitive skin groups are presented in Table 3. Both groups had a median of seven products used daily and one product being used weekly. The Mann-Whitney test was employed to compare the medians between the two groups due to the non-normal distribution of the data, and no significant differences were found.

Table 2. Comparison of daily and weekly cosmetic product usage frequency

Characteristic	Frequency of cosmetic usage (Mean±SD)	
	NSS (N=104)	SS (N=32)
Decorative cosmetic		
Foundation	0.11±0.309	0.25±0.508
Face Powder	0.78±0.775	1.06±0.982
Concealer	0.13±0.360	0.53±0.842
Mascara	0.14±0.404	0.50±0.718
Eyebrow	0.17±0.428	0.47±0.842
Lipstick	1.38±0.958	2.19±1.512
Blush on*	0.43±1.121	0.69±1.424
Eyeshadow*	0.19±0.801	0.34±1.125

Characteristic	Frequency of cosmetic usage (Mean±SD)	
	NSS (N=104)	SS (N=32)
Cleanser		
Facial Wash	2.09±0.655	2.09±0.777
Chemical exfoliator*	0.43±0.773	0.41±0.798
Cleansing balm*	0.18±0.810	0.34±1.335
Micellar water*	4.31±4.201	3.66±5.283
Cleansing milk*	0.16±0.739	0.53±1.934
Sunscreen	1.63±0.815	1.47±0.983
Skin care		
Lip gloss	0.26±0.683	0.59±1.188
Lip balm	1.35±1.156	1.91±1.673
Toner	1.12±0.948	0.84±1.051
Face serum	0.94±0.879	0.66±0.937
Night cream	0.24±0.429	0.19±0.397
Moisturizer	1.22±0.892	1.34±1.066

(*) weekly products

Table 3. Comparison of the number of routinely used cosmetic products

	Number of products/day/person*		Number of products/week/person**	
	NSS	SS	NSS	SS
Min	0	0	0	0
Max	12	13	5	5
Mean	6.73	7.13	1.36	1.41
SD	2.505	3.377	1.033	1.388
Median	7.00	7.00	1.00	1.00
N	104	32	104	32
p-value	0.582#		0.734#	

*14 daily used products; **6 weekly used products; NSS: non-sensitive skin; SS: sensitive skin; #mann-whitney test

DISCUSSION

The LAST results finds that 32 participants (23.5%) have sensitive skin. No significant difference exists in the number of cosmetic products routinely used daily between non-sensitive and sensitive skin groups (p=0.582). A similar finding was reported in a study by Brenaut et al. in France, suggesting that the mere number of products used may not be the primary determinant for the occurrence of sensitive skin.[3]

Although our findings shows no significant relationship between cosmetics usage and sensitive skin, this does not necessarily refute the theoretical basis that cosmetics can trigger sensitive skin.[18,19] This idea is consistent with meta-analyses that have specifically identified cosmetics as a triggering factor for sensitive skin.[18] The absence of a significant relationship in our study might be explained by other factors. A recent study conducted in France by Brenaut et al. finds that having sensitive skin actually influences cosmetic usage patterns among respondents. The results states that nearly half (48%) of participants with sensitive skin reported deliberately reducing the number of products they use due to their skin condition. However, the quantitative analysis reveals no significant difference in the number of products being used. The study from Brenaut et al. suggests that participants were more likely to start using most of their cosmetic products before their skin became sensitive.[3]

In this study, respondents with sensitive skin tend to answer “often” and “always” when purchasing cosmetics labeled “for sensitive skin” compared to the non-sensitive skin group, with percentages of 46.9% and 15.3%, respectively. This aligns with the findings which shows that women with sensitive skin are also more likely to purchase cosmetics recommended for sensitive skin.[3] This also possibly explains the non-significant relationship between the number of cosmetic products used and the incidence of sensitive skin, as respondents with sensitive skin used approximately the same average number of products as those with non-sensitive skin. In

our study, we only assessed the quantity of products used by both groups without evaluating whether the products were specifically formulated for sensitive skin.

A study reported that the sensitive skin group used a higher amount of moisturizer than the non-sensitive skin group. On the other hand, our study found that the mean frequency of moisturizer use was higher in the sensitive skin group compared to the other group (Table 2). Moisturizer is an effective cosmetic product for improving sensitive skin conditions as it repairs the skin barrier, increases skin hydration by reducing trans epidermal water loss (TEWL), and restores the lipid barrier that maintains proper water distribution. For sensitive skin specifically, moisturizers containing natural oils with high linoleic acid and natural or synthetic ceramides provide optimal benefits through their anti-inflammatory, antipruritic, and barrier-enhancing properties.[25]

Among the 20 cosmetic products surveyed, facial wash is the most commonly used, which aligns with the study in Yogyakarta, Indonesia, by Lestari and Widayati in 2022.[26] Sunscreen is the second most commonly used product, with a usage rate of over 70%. A similar result is found among respondents from a public high school in Selong with a percentage of 71%.[27] This indicates that the majority of participants in this study already practice basic skin care routine.

So far, studies on sensitive skin have been conducted in several countries.[2,28] According to a meta-analysis by Chen, Dai, and Li, the prevalence of sensitive skin in Asia is 31% and is experienced primarily on the face.[2] Our study shows that 23.5% of our participants identified as having sensitive skin, which aligns with a study conducted in China, which found that 23% of respondents have sensitive skin.[29] However, this contrasts with the study by Xiao et al, which found a higher prevalence of sensitive skin among the 18-30 age group, with a percentage of 64.1% to 65.8%.[16]

In addition to cosmetic use, the menstrual period has also been reported as a trigger for sensitive skin.[17] As skin sensitivity can also be triggered by hormonal changes during pre-menstruation, participants were questioned about their menstrual phase. In this study, no significant difference is found between the menstrual cycle and the occurrence of sensitive skin. A similar result was also found in other studies, which stated that there was no significant relationship between the prevalence of sensitive skin occurrence and the menstrual cycle (premenstrual, menstrual, and post-ovulatory phase) that included East Asian population groups as part of the subjects.[30]

This study has advanced current knowledge on the link between cosmetic use and sensitive skin in the Indonesian young adult female population. However, there are several limitations to this study. First, since it only involved Indonesian female young adult participants, the results cannot be generalized to the entire young adult population. Secondly, it is a cross-sectional design study, so it cannot explain the causal relationship between cosmetic usage patterns and the occurrence of sensitive skin. Third, this study did not analyze the ingredients and the volume used for each cosmetic product by the respondents. Lastly, this research did not study respondents' atopic history, which could be a predisposing factor for sensitive skin. People with atopic dermatitis are vulnerable for cosmetic that acts as allergen which can cause skin reactions, such as a sensitive skin condition.[31] Therefore, it warrants further studies. A more extensive and diverse population is needed to allow analysis for variation of population characteristics and cosmetic usage patterns. A prospective cohort study could be conducted to assess the influence of cosmetic products based on the number of products used in a specific period of time, their ingredients, the amount of volume used, environmental effects on the skin, and across more diverse age groups. While this study's findings are primarily applicable to female adolescents and young adults, they offer a foundation for future investigations into the effects of cosmetic products on sensitive skin across different demographics.

CONCLUSION

In conclusion, this study has added insights into the relationship between cosmetics usage and the incidence of sensitive skin, using the LAST as a diagnostic test. Although we found no significant differences between non-sensitive and sensitive skin groups regarding the number of

cosmetic products used, this does not undermine the potential impact of cosmetics on sensitive skin. It is supposed that individual skin conditions may influence cosmetic usage patterns, highlighting the need for further research.

CONFLICT OF INTEREST

The authors declare no conflict of interest

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DATA AVAILABILITY

Data are available upon reasonable request by contacting the corresponding author.

SUPPLEMENTAL DATA

Supplemental data are available upon reasonable request by contacting the corresponding author.

AUTHORS CONTRIBUTION

NWC developed the study proposal, conducted data collection and analysis, and drafted the manuscript. DH conceptualized the study design and supervised the overall conduct of the study. DPS advised on methodological planning and guided the statistical analysis. DH and DPS critically reviewed and provided substantive input to improve the manuscript. All authors have read and approved the final version of the manuscript.

DECLARATION OF USING AI IN THE WRITING PROCESS

The authors used Grammarly (a writing assistance tool developed by Grammarly, Inc, United States) for grammar and language editing. No AI tools were used for content generation or data analysis.

ABBREVIATION LIST

LAST: Lactic Acid Stinging Test; SS: Sensitive Skin; NSS: Non Sensitive Skin; I-CVI: Mean Item Content Validity Index; S-CVI/Av: Scale Content Validity Index Average; S-CVI/UA: Scale Content Validity Index Universal Agreement; TEWL: Transepidermal Water Loss

REFERENCES

1. Issa MCA, Tamura B. Daily Routine in Cosmetic Dermatology. 2017.; DOI: 10.1007/978-3-319-12589-3. ISBN: 978-3-319-12589-3
2. Chen W, Dai R, Li L. The prevalence of self-declared sensitive skin: A systematic review and meta-analysis. J Eur Acad Dermatology Venereol 2020;34(8):1779–1788; DOI: 10.1111/jdv.16166.
3. Brenaut E, Nezet P, Misery L, Legeas C, Roudot AC, Ficheux AS, et al. Use of cosmetic products in real life by women with facial sensitive skin: Results from an exposure study and comparison with controls. Skin Pharmacol Physiol 2021;34(6):363–374; DOI: 10.1159/000517525.
4. Husain K. A survey on usage of personal care products especially cosmetics among university students in Saudi Arabia. J Cosmet Dermatol 2018;18(1):271–277; doi: 10.1111/jocd.12773.
5. Kureh TG, Ndesangia A, Opio RD, Umoh IO, Aruwa JO, Okoruwa GA. Use of cosmetic products and related adverse reactions among health science students. J Young Pharm

2020;12(2):271–274; DOI: 10.5530/jyp.2020.12.74.
6. Udayanga L, Subashini N, Udugama M, Silva P, Rabathunge T. Knowledge, perceptions, and consumption behaviour of cosmetics among undergraduates of Sri Lanka: A descriptive cross-sectional study. Front Public Heal 2024;11(January):1–12; DOI: 10.3389/fpubh.2023.1184398.
7. Biesterbos JWH, Dudzina T, Delmaar CJE, Bakker MI, Russel FGM, Goetz N, et al. Usage patterns of personal care products: Important factors for exposure assessment. Food Chem Toxicol 2013;55:8–17; DOI: 10.1016/j.fct.2012.11.014.
8. Perera MPN, Peiris WMDM, Pathmanathan D, Mallawaarachchi S, Karunathilake IM. Relationship between acne vulgaris and cosmetic usage in Sri Lankan urban adolescent females. J Cosmet Dermatol 2017;17(3):1–6; DOI: 10.1111/jocd.12431.
9. Panjaitan JS. Hubungan antara penggunaan kosmetik terhadap terjadinya akne vulgaris di Poliklinik Kulit Kelamin Royal Prima dan Murni Teguh Memorial Hospital Kota Medan. Nommensen J Med 2020;6(1):22–25; DOI:10.36655/njm.v6i1.259.
10. Shaaban H, Alhajri W. Usage patterns of cosmetic and personal care products among female population in Saudi Arabia: Important factors for exposure and risk assessment. J Environ Public Health 2020;2020; DOI: 10.1155/2020/8434508.
11. Suh DH, Oh H, Lee SJ, Kim HJ, Ryu HJ. Relationship between acne and the use of cosmetics: Results of a questionnaire study in 539 Korean individuals. J Cosmet Dermatol 2021;20(7):2172–2178; DOI: 10.1111/jocd.13853.
12. Hidajat IJ, Regina R, Matthew F,Melyawati M. Over the counter (OTC) product use patterns in medical students with acne vulgaris. Damianus J Med 2022;21(3):233–238.
13. Ferdinand M, Ciptono WS. Indonesia's cosmetics industry attractiveness, competitiveness and critical success factor analysis. J Theory Appl Manag 2022;15(2):209–223; DOI: 10.20473/jmtt.v15i2.37451.
14. Briliana V, Mursito N. Exploring antecedents and consequences of Indonesian Muslim youths' attitude towards halal cosmetic products: A case study in Jakarta. Asia Pacific Manag Rev 2017;22(4):176–184; DOI:10.1016/j.apmrv.2017.07.012.
15. Zirwas MJ. Contact dermatitis to cosmetics. Clin Rev Allergy Immunol 2019;56(1):119–128; doi: 10.1007/s12016-018-8717-9.
16. Xiao X, Qiao L, Ye R, Zuo F. Nationwide survey and identification of potential stress factor in sensitive skin of Chinese women. Clin Cosmet Investig Dermatol 2020;13:867–874; DOI: 10.2147/CCID.S284359.
17. Misery L, Ständer S, Szepietowski JC, Reich A, Wallengren J, Evers AWM, et al. Definition of sensitive skin: An expert position paper from the special interest group on sensitive skin of the international forum for the study of itch. Acta Derm Venereol 2017;97(1):4–6; DOI: 10.2340/00015555-2397.
18. Brenaut E, Barnetche T, Gall-lanotto C Le, Roudot AC, Misery L, Ficheux AS. Triggering factors in sensitive skin from the worldwide patients ' point of view : A systematic literature review and meta-analysis. J Eur Acad Dermatology Venereol 2020;34:230–238.
19. Duarte I, Silveira JEPS, Hafner M de FS,Toyota R, Pedroso DMM. Sensitive skin: Review of an ascending concept. An Bras Dermatol 2017;92(4):521–525; DOI: 10.1590/abd1806-4841.201756111.
20. Corazza M, Guarneri F, Montesi L, Toni G, Donelli I, Borghi A. Proposal of a self-assessment questionnaire for the diagnosis of sensitive skin. J Cosmet Dermatol 2022;21(6):2488–2496; DOI:10.1111/jocd.14425.
21. Ebbesen AR, Riis LA, Gradman J. Effect of topical steroids on skin prick test: A randomized controlled trial. Dermatol Ther (Heidelb) 2018;8(2):285–290; DOI:10.1007/s13555-018-0238-1.
22. Yusoff MSB. ABC of content validation and content validity index calculation. Educ Med J 2019;11(2):49–54; DOI: 10.21315/eimj2019.11.2.6.
23. Ding DM, Tu Y, Man MQ, Wu WJ, Lu FY, Li X, et al. Association between lactic acid sting test scores, self-assessed sensitive skin scores and biophysical properties in Chinese females. Int

J Cosmet Sci 2019;398–404; DOI: 10.1111/ics.12550.
24. Alexander H, Brown S, Danby S, Flohr C. Research techniques made simple : transepidermal water loss measurement as a research tool. J Invest Dermatol 2018;138(11):2295–2300; DOI: 10.1016/j.jid.2018.09.001.
25. Kohli M, Pant H, Dixit R, Parthasaradhi A. Expert consensus on defining sensitive skin and role of cosmeceuticals: an Indian perspective. Int J Res Dermatology 2020;6(6):827; DOI: 10.18203/issn.2455-4529.intjresdermatol20204577.
26. Lestari RD, Widayati A. Profil penggunaan kosmetika di kalangan remaja putri SMK Indonesia Yogyakarta. Maj Farm 2022;18(1):8; DOI: 10.22146/farmaseutik.v18i1.70915.
27. Pertiwi AF, Vanini A, Wulandhari S, et al. Hubungan penggunaan kosmetik dengan kejadian acne vulgaris pada remaja SMAN 1 Selong. J Ilm Kesehat Med DRG Suherman 2023;5(01):31–37.
28. Guerra-Tapia A, Serra-Baldrich E, Cabezas PL, Gonzales-Guerra EG, Lopez-Estebaranz JL. Diagnosis and treatment of sensitive skin syndrome: An algorithm for clinical practice. Actas Dermosifiliogr 2019;110(10):800–808; DOI: 10.1016/j.ad.2018.10.021.
29. Farage MA, Mandl CP, Berardesca E, Maibach HI. Sensitive skin in china. J Cosmet Dermatological Sci Appl 2012;02(03):184–195; DOI: 10.4236/jcdsa.2012.23035.
30. Deloche C, Skayem C, Taieb C, Kovylkina N, Faure J, Eamilao D, et al. An international study on sensitive skin across continents in over 20.000 women: Geographic and age-related differences, menstrual regularities and cycle phase influence, and effect on WEMWBS score. J Womens Heal Dev 2025;8(1):7–9; DOI: 10.26502/fjwhd.2644-288400133.
31. Marcelino J, Giménez-arnau AM. Impact of cosmetics and cleansers in atopic dermatitis — how to advise patients. Curr Treat Options Allergy 2024;11:62–76; DOI:10.1007/s40521-024-00360-1.