The relationship between cosmetic usage and the occurrence of acne vulgaris

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Abstract. Acne vulgaris is one of the most common types of skin conditions worldwide. It is found in 27.7% of individuals aged 10-12 years in Australia, and 93.3% in those aged 16-18 years. Sufferers of acne vulgaris, predominantly women, often find it challenging to discontinue the habit of using cosmetics. Individuals with acne vulgaris frequently seek cosmetics that can be used without causing or worsening their condition. This study employs a quantitative research method with an analytical cross-sectional approach. The sampling technique employed in this study is purposive sampling. The data analysis used involves univariate analysis with the chi-square statistical test. The largest group of respondents in this study is aged 18 years, with a total of 58 respondents (81.7%). The results of the frequency distribution of cosmetic usage show that 34 individuals (47.9%) use foundation, 65 individuals (91.5%) use facial cleansers, 47 individuals (66.2%) use sunscreen, and 12 individuals (16.9%) use blush-on. Furthermore, 48 individuals (67.6%) experience acne vulgaris. The results of the chi-square test analysis indicate that there is no significant association between the use of foundation, facial cleansers, sunscreen, and blush-on with the occurrence of acne vulgaris (p-value > 0.05). There is no correlation between the use of foundation, facial cleansers, sunscreen, and blush with the occurrence of acne vulgaris

1 Introduction

Smooth, bright, and healthy skin is the desire of everyone, and beautiful skin reflects the owner's care for their health. However, in reality, many people face skin problems. The most common issue is acne vulgaris (AV) [1]. Acne vulgaris is a chronic inflammation of

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sebaceous follicles characterized by comedones, papules, pustules, nodules, and cysts. The most common areas affected by acne vulgaris are the face, back, and chest [2]. Acne vulgaris is characterized by non-inflammatory comedones, inflammatory papules, pustules, and nodules, which can be open or closed. Acne vulgaris typically affects areas of the skin with a high density of sebaceous follicles [3]. To date, the exact cause of acne vulgaris is not known, but there are several influencing factors. Some of these factors include genetics, hormones, cosmetic usage, infections, and psychology [4]. Hormonal changes and excessive sebum production can lead to acne. However, the frequent and heavy use of cosmetics can also be a risk factor for acne vulgaris [2].

In general, acne vulgaris typically begins at the ages of 12-15, with its severity peaking between the ages of 17-21. Acne vulgaris is most common in teenagers aged 15-18. The prevalence of acne vulgaris in Indonesia is relatively high, ranging from 47% to 90% among teenagers [5, 6]. The frequency of moderate to severe acne among high school students was 19.9% [7]. In 2010, data from the Cosmetic Dermatology Division of the Department of Dermatology and Venereology at Dr. Cipto Mangukusumo Hospital in Jakarta revealed 6,612 cases of acne vulgaris patients visiting over three years. These cases included 941 mild acne vulgaris cases, 1,022 moderate acne vulgaris cases, and 308 severe acne vulgaris cases each year [8]. At RSUP Dr. Sardjito Yogyakarta, the prevalence of acne vulgaris accounted for 8.8% of cases in dermatology outpatient visits and ranked fourth out of the top ten cases in the dermatology and venereology outpatient clinic [9].

In general, acne appears at the ages of 14-17 in women and 16-19 in men, with comedones and papules being the primary lesions. Acne first appears during puberty when adrenal androgen hormones trigger the pilosebaceous unit. Acne can also occur as early as age 6-7, depending on the severity of adrenarche [8]. Among teenagers, acne vulgaris is more common in women than in men. About 85% of high school students aged 15-18, both males and females, have various skin issues [2].

Cosmetics are products or combinations of substances intended for external use on the body (cuticle, hair, nails, lips, external genitalia, teeth, and oral cavity). The use of cosmetics is intended for cleansing, enhancing attractiveness, altering appearance, maintaining healthy skin, and combating body odor but not to cure other skin diseases [10].

Cosmetics caused 95% of AV cases, cosmetic acne showed mild acne vulgaris. The duration of cosmetic application was not significantly associated with the severity of acne vulgaris, and no improvement in acne vulgaris was seen with cessation of cosmetic application [11].

The ingredients contained in cosmetics have fewer natural components and are rich in synthetic materials. Cosmetics can cause acne vulgaris if they contain comedogenic ingredients [12]. Some examples of active ingredients such as para-aminobenzoic acid (PABA), sulfur, hydrogen peroxide, and aluminium chloride are examples of comedogenic active ingredients [13] and chemical derivatives of lanolin such as acetylated and ethoxylated lanolin are highly comedogenic which can cause acne vulgaris [14]. Comedogenicity is described as a non-inflammatory follicular reaction, manifested as solid hyperkeratosis within the follicles [15]. The ingredients that cause acne vulgaris are found in various face creams such as foundations, moisturizers, sunscreens, and night creams that contain ingredients such as lanolin, pure chemicals (butyl stearate, lauryl alcohol, red dyes D & C and oleic acid) [15, 16]. When comedogenic substances accumulate in skin follicles, they can cause the follicles to become blocked and lead to acne vulgaris [12].

Therefore, it is essential to provide effective, easily accessible, and affordable education about the dangers of cosmetic alterations. This includes promoting the use of non-abrasive cleansers and moisturizers while avoiding the use of acne-causing cosmetic products, particularly those with thick consistency [4].

2 Material and Methods

This research is a quantitative observational analytic study using a cross-sectional design. The population of this study consists of 12th-grade female students majoring in beauty at SMK Negeri 4 Yogyakarta. The subjects were sampled using a purposive sampling technique based on specific criteria. The inclusion criteria were being enrolled as a 12th-grade beauty student at SMK Negeri 4 Yogyakarta, aged 15-18, and willing to sign an informed consent form. The exclusion criteria were being absent during sampling, receiving doctor's treatment for acne with systemic medication, consuming hormonal drugs/other drugs affecting acne (birth control pills, corticosteroids), and having other facial conditions diagnosed by a doctor (dermatitis, lupus). A total of 71 subjects were obtained for this study.

In this research, the variables investigated are the use of cosmetics as the independent variable and the occurrence of acne vulgaris as the dependent variable. The research instrument used is a questionnaire containing informed consent, respondent's identity, respondent's characteristics, and questions about cosmetic use with options for "yes" and "no." Additionally, the measuring tool used involves photographs of the facial area from all sides and processing the data using SPSS version 26.

3 Results and Discussion

The research results show that 71 respondents met the inclusion criteria. The majority of respondents in this study were 18 years old, with 58 respondents (81.7%). According to the frequency distribution of cosmetic usage, 34 respondents (47.9%) used foundation, 65 respondents (91.5%) used facial cleanser, 47 respondents (66.2%) used sunscreen, and 12 respondents (16.9%) used blush on. Out of these, 48 respondents (67.6%) experienced acne vulgaris.

3.1 Relationship between Foundation and Acne Vulgaris

Table 1. Relationship between foundation and acne vulgaris

Foundation		Acne Vulgaris		Total	P-Value	OR
		No	Yes			
No	n	14	23	37	0.307	1.691
	%	37.8%	62.2%	100%		
Yes	n	9	25	34		
	%	26.5%	73.5%	100%		
Total	n	23	48	71		
	%	32.4%	67.6%	100%		

The analysis results show a p-value of 0.307, indicating that H0 is accepted and H1 is rejected. Based on these results, it can be concluded that there is no relationship between the use of foundation and acne vulgaris.

3.2 Relationship between Facial Cleanser and Acne Vulgaris

Table 2. Relationship between facial cleanser and acne vulgaris

Facial Cleanser		Acne Vulgaris		Total	P-Value	OR
		No	Yes			
No	n	2	4	6	1	1.048
	%	33.3%	66.7%	100%		
Yes	n	21	44	65		
	%	32.3%	67.7%	100%		
Total	n	23	48	71		
	%	32.4%	67.6%	100%		

Analysis results show a p-value of 1, indicating that H0 is accepted, and H1 is rejected. Based on these results, it can be concluded that there is no relationship between the use of facial cleansers and acne vulgaris.

3.3 Relationship between Sunscreen and Acne Vulgaris

Table 3. Relationship between sunscreen and acne vulgaris

Sunscreen		Acne Vulgaris		Total	P-Value	OR
		No	Yes			
No	n	8	16	24	0.904	1.067
	%	33.3%	66.7%	100%		
Yes	n	15	32	47		
	%	31.9%	68.1%	100%		
Total	n	23	48	71		
	%	32.4%	67.6%	100%		

The analysis results show a p-value of 0.904, indicating that H0 is accepted, and H1 is rejected. Based on these results, it can be concluded that there is no relationship between the use of sunscreen and acne vulgaris.

3.4 Relationship between Blush on and Acne Vulgaris

Table 4. Relationship between blush on and acne vulgaris

Blush on		Acne Vulgaris		Total	P-Value	OR
		No	Yes			
No	n	19	40	59	1	0.950
	%	32.2%	67.8%	100%		
Yes	n	4	8	12		
	%	33.3%	66.7%	100%		
Total	n	23	48	71		
	%	32.4%	67.6%	100%		

The analysis results show a p-value of 1, indicating that H0 is accepted, and H1 is rejected. Based on these results, it can be concluded that there is no relationship between the use of blush on and acne vulgaris.

The research results showed that 71 respondents met the inclusion criteria. The majority of respondents in this study were 18 years old, with 58 respondents (81.7%). According to the frequency distribution of cosmetic usage, respondents used foundation in 34 cases (47.9%), facial cleanser in 65 cases (91.5%), sunscreen in 47 cases (66.2%), and blush in 12 cases (16.9%). Out of these, 48 respondents (67.6%) experienced acne vulgaris.

The analysis results indicated that there is no relationship between the use of foundation, facial cleanser, sunscreen, and blush on the occurrence of acne vulgaris (p-value > 0.05). This

is in line with a study conducted by Ulfah[18] in Aceh Besar, which involved 126 respondents in a cross-sectional design and found that 65.1% experienced acne vulgaris while using cosmetics. The study also concluded that there is no relationship between the use of cosmetics and the occurrence of acne vulgaris among female medical students at Universitas Abulyatama Aceh Besar in 2020. This is because the respondents in this study paid attention to the cosmetics they used by studying their contents, knowing the substances they contained, and using cosmetics approved by the National Agency for Drug and Food Control (BPOM). Additionally, this study did not differentiate between the contents of each cosmetic used, making the study subjects essentially heterogeneous.

This finding is consistent with a study conducted by Tooy [19] in Manado. Their cross-sectional study found no relationship between the use of BB Cream, which is a type of foundation, and the occurrence of acne vulgaris among female medical students at Universitas Sam Ratulangi. This lack of association may be because the use of BB Cream should be tailored to individual skin needs and good hygiene practices. Additionally, it could be influenced by bias factors in the study, as acne vulgaris was found in all respondents during the research. This study also had confounding factors that could affect the results, such as a family history of acne, menstruation, and dietary habits.

In a study conducted by Nirwani [12] in Yogyakarta, it was found that there was no relationship between the use of facial sunscreen and facial cleanser with the occurrence of acne vulgaris among female students at SMAN 2 Sleman, Yogyakarta. This lack of association may be attributed to the diverse skin protection equipment and materials used, both physical and chemical, as well as the frequency of use. Sunscreen that clogs pores should be avoided in patients with acne, as it can exacerbate the condition. Therefore, the healing process should involve non-oily and non-comedogenic products.

However, this research contradicts the study conducted by Mauliza [4] among high school female students in Banda Aceh, which found a relationship between the use of cosmetics and the occurrence of acne vulgaris ($p = 0.017$) with 180 respondents. The difference between Mauliza's study and this research is that Mauliza conducted a direct physical examination of the respondents. Similar results were also obtained in the study conducted by Andriana R[20] at Universitas Lampung's Faculty of Medicine, which involved 230 respondents in a cross-sectional design. This study found an association between the use of cosmetics and the occurrence of acne vulgaris, as the frequent change of cosmetics and their use were associated with a higher incidence of acne vulgaris.

Acne vulgaris can occur when all the pathogenic components of acne vulgaris are present, including excessive keratin production, excessive sebum production, and Cutibacterium acnes infection, followed by inflammation. This condition occurs in teenagers and young adults because hormonal homeostasis that regulates lipid metabolism is usually not mature in this age group, leading to excessive sebum production and increasing the risk of acne vulgaris[18]. The researcher suspects that the occurrence of acne vulgaris can be caused by the use of cosmetics containing comedogenic substances such as lanolin, butyl stearate, coconut oil, shea butter, and cetyl alcohol. These substances can clog pores, leading to acne vulgaris, and the frequent change of cosmetics can also contribute to acne vulgaris.

The weakness of this study is that the diagnosis of acne vulgaris was carried out by a dermatome and venerology doctor through questionnaires and by examining photos of all areas of the face without a direct examination. This study also did not ask respondents about the frequency of cosmetic use in a day. The advantage of this research is that researchers can ask what cosmetic products respondents often use.

4 Conclusion

Our study highlighted that there is no relationship between the use of cosmetics and the occurrence of acne vulgaris in the respondents, and the incidence of acne vulgaris in this study is 67.6%, and the most commonly used cosmetics are facial cleanser by 65 respondents (91.5%), sunscreen by 47 respondents (66.2%), foundation by 34 respondents (47.9%), and blush on by 12 respondents (16.9%).

References

1 A. adibah dwi Purnama, Pengaruh Tingkat Pengetahuan Akne Vulgaris Terhadap Kejadian Timbulnya Akne Vulgaris Pada Mahasiswa Kedokteran Fakultas Kedokteran dan Ilmu Kesehatan Unversitas Muhammadiyah Makassar. 2021.
2 J. S. Panjaitan, "Hubungan Antara Penggunaan Kosmetik Terhadap Terjadinya Akne Vulgaris di Poliklinik Kulit Kelamin Royal Prima dan Murni Teguh Memorial Hospital Kota Medan," Nommensen J. Med., vol. 6, no. 1, pp. 22–25, 2020.
3 S. Kabau, "Hubungan Antara Pemakaian Jenis Kosmetik Dengan Kejadian Akne Vulgaris," vol. 1, no. 1, pp. 1–71, 2012.
4 M. Mauliza, E. Elmiyati, and A. Andri, "Pengaruh Penggunaan Kosmetik Terhadap Acne Vulgaris Pada Remaja Putri Kelas I Dan Kelas Ii Sma Negeri 4 Banda Aceh," J. Ilmu Kedokt. dan Kesehat., vol. 7, no. 1, pp. 375–380, 2020.
5 I. B. S. Sitohang and S. M. Wasitatmadja, "Akne vulgaris," Ilmu Penyakit Kulit dan Kelamin UI, pp. 288–292, 2016.
6 C. Prakasita and M. Meiyanti, "Hubungan kebiasaan merokok dan akne vulgaris pada remaja usia 15-17 tahun," J. Biomedika dan Kesehat., vol. 1, no. 2, pp. 164–169, 2018.
7 & D. M. T. Andrea L. Zaenglein, Emmy M. Graber, "Acne Vulgaris and Acneiform Eruptions," Fitzpatrick's Dermatology Gen. Med., vol. 379, no. 14, pp. 1343–1352, 2012.
8 S. Murlistyarini, Akne Vulgaris, Cetakan Pe. Malang: UB Press, 2019.
9 P. P. P. KRISTI, "Tigkat Pengetahuan Siswi SMA Stella Duce 1 Yofyakarta Terhadap Acne Vulgaris," 2016.
10 2010 Permenkes, "Permenkes Menteri Kesehatan Republik Indonesia Nomor 1175/Menkes/Per/VIII/2010." 2010.
11 A. Teresa, "Akne Vulgaris Dewasa : Etiologi, Patogenesis Dan Tatalaksana Terkini," J. Kedokt. Univ. Palangka Raya, vol. 8, no. 1, pp. 952–964, 2020.
12 W. Nirwani, Rosmelia, and B. E. Suryaningsih, "Hubungan Penggunaan Kosmetik Dengan Tingkat Keparahan Akne Vulgaris Pada Remaja Wanita di SMA N 2 Sleman, Yogyakarta," jurnal kedokteran, vol. 126, no. 1. p. 21, 2019.
13 S. M. Wasitaatmadja, Penuntun Ilmu Kosmetik Medik. Jakarta: Universitas Indonesia (UI-Press), 1997.
14 L. N. Ashandi, "Akne kosmetik," S. M. Wasitaatmadja, Ed. Jakarta: Departemen Ilmu Kesehatan Kulit dan Kelamin RSPAD Gatot Soebroto, Jakarta, 2018, pp. 75–84.
15 L. Baumann, "Acne Type 1 Sensitive Skin," in Cosmetic Dermatology Principles and Practice Practice, 2nd edition, New York, 2010, pp. 121–127.
16 I. G. A. E. Wibawa and K. K. Winaya, "Karakteristik Penderita Acne Vulgaris di Rumah Sakit Umum (RSU) Indera Denpasar Periode 2014-2015," J. Med. Udayana, vol. 8, no. 11, pp. 1–4, 2019.
17 dr. R. I. Tranggono and A. D. F. L. Latifah, Buku Pegangan Ilmu Pengetahuan Kosmetik. Jakarta: PT Gramedia Pustaka Utama, 2007.
18 N. Ulfah, "Vol. 1, No. 6, Desember 2020," Hub. Paparan Kosmet. dengan Kejadian Akne Vulgaris Pada Mahasiswi Fak. Kedokt., vol. 1, no. 6, 2020.

19 M. P. Tooy, M. G. Kapantow, and F. O. Mawu, "Hubungan Penggunaan BB Cream (Blemish Balm Cream) Terhadap Kejadian Akne Vulgaris Pada Mahasiswi Fakultas Kedokteran Angkatan 2015 dan 2016 Universitas Sam Ratulangi," Skripsi, Jur. Pendidik. Dr. Fak. Kedokteran, Univ. Sam Ratulangi, vol. 1, pp. 5–9, 2019.
20 K. N. Andriana, R., Effendi, A., Berawi, "Hubungan Penggunaan Kosmetik Bedak Padat Terhadap Kejadian Akne Vulgaris pada Mahasiswi Fakultas Kedokteran Universitas Tarumanagara," Univ. Lampung, pp. 142–148, 2022.