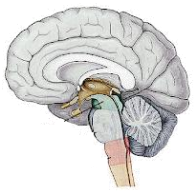
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THE RELATIONSHIP BETWEEN THE LEVEL OF KNOWLEDGE OF HAZARDOUS MATERIALS AND THE ATTITUDE TOWARDS CHOOSING COSMETICS AMONG NURSING STUDENTS AT KEPANJEN UNIVERSITY

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ABSTRACT

Comprehension of harmful substances in cosmetic products is still lacking among female nursing students, even though they have a role in ensuring the safety of cosmetics as health workers. This study aims to analyze the relationship between the level of knowledge about hazardous materials and attitudes in choosing cosmetics among female nursing students at Kepanjen University. This study used a quantitative descriptive analytical method with a cross-sectional approach. The sample consisted of 173 female students selected using the Proportionate Stratified Random Sampling technique. Data collection was carried out through a questionnaire containing 30 statements related to the level of knowledge and attitudes in choosing cosmetics. Data were analyzed using the chi-square test. The results showed that most respondents had a high level of knowledge (90.8%). However, attitudes in choosing cosmetics varied, with 58.4% having a good attitude and 41.6% having a poor attitude. Statistical tests showed that there was no significant relationship between the level of knowledge about harmful substances and attitudes in choosing cosmetics (p-value = 0.251; $p > 0.05$). In conclusion, although the majority of female students have a good understanding of harmful substances in cosmetic products, this does not directly affect their attitudes in choosing products. Further studies are needed to identify other factors that may influence attitudes towards cosmetic selection.

INTRODUCTION

According to a recent study by the European Chemicals Agency (ECHA), of 4,500 cosmetic products inspected in Europe, 285, or approximately 6% of the total, were found to contain banned hazardous ingredients. The Indonesian Food and Drug Authority (BPOM) reported that 51,791 non-compliant cosmetic products were found in 2024, including 5,937 containing banned ingredients such as hydroquinone and clindamycin. Of the 731 beauty clinics inspected, 33% did not comply with regulations. Furthermore, BPOM also recorded 27 hazardous cosmetic items produced through contract production between November 2023 and August 2024. This intensive monitoring aims to protect consumers from health risks resulting from the use of illegal and hazardous cosmetics. Cosmetics identified as containing hazardous ingredients include the dyes K3 red and K10 red (rhodamine B), mercury, retinoic acid, and hydroquinone. These monitoring findings align with a systematic review by Bastiansz et al. (2022) who mapped mercury exposure from skin lightening products in various countries, as well as Lewis's (2023) assessment which called mercury in skin lightening products a global beauty hazard.

Current beauty trends have influenced consumer behavior in Indonesia, particularly among teenagers, leading to the emergence of various new industries with a wide variety of cosmetic products readily accessible to the public. Increasingly modern lifestyles have made people, especially teenagers, increasingly concerned about the appearance of their skin, leading many to use various cosmetic products to boost their self-confidence. Consumer characteristics have been shown to be related to consumption

values, brand attitudes, and behavioral intentions toward cosmetic products (Yoon & Bae, 2024). Cosmetics are products applied to the external parts of the human body, such as nails, skin, lips, hair, teeth, and oral mucosa. These products aim to cleanse, provide fragrance, change appearance, enhance fragrance, and protect and maintain good physical condition. Cosmetics are considered safe if they are produced in accordance with Good Manufacturing Practice (GMP) guidelines and standards, ensuring that the resulting products meet quality standards, are suitable for their intended use, and are free from harmful chemicals.

According to the BPOM Regulation on Technical Requirements for Cosmetic Ingredients, hazardous chemicals in cosmetics are divided into two categories: prohibited chemicals and restricted chemicals. Prohibited hazardous chemicals include mercury, red dyes K3 and K10 (rhodamine B), and retinoic acid. Hazardous chemicals permitted with certain restrictions in cosmetics include hydroquinone with a maximum limit of 0.02%, formaldehyde with a maximum limit of 5%, triclosan with a maximum limit of 0.3%, and resorcinol with a maximum limit of 0.5%. The use of these hazardous chemicals in cosmetics can pose a health risk. Mercury, which is often found in lotions, is a heavy metal that is toxic and carcinogenic. Synthetic dyes that are often misused, such as rhodamine B, have side effects on health, such as disrupting liver function and being carcinogenic, while hydroquinone can cause skin irritation and hyperpigmentation. A study by Abed et al. (2024) summarized the health impacts of heavy metals in cosmetics and their regulatory limits, and Bîrsan (2023) emphasized the health risks of mercury exposure from cosmetics. In Indonesia, hydroquinone is still found in commercially available creams, as demonstrated by Adriani and Safira (2019) in their UV-Vis spectrophotometric analysis of doctor's creams.

The use of skin-lightening cosmetics among college students is not simply a matter of knowledge. Abbas et al. (2020) found mercury exposure and health problems among college students using skin-lightening cosmetics in Makassar. Based on the results of research by Fadila et al. (2022) on the relationship between cosmetic knowledge and the choice of facial skincare cosmetics among eleventh-grade students majoring in Beauty Treatment at SMK Negeri 7 Padang, it was concluded that knowledge reached 74.21% and cosmetic choice reached 84.08%. Purba et al. (2025) described the level of knowledge, attitudes, and behavior regarding the use of facial whitening cosmetics among medical students. The results of observations conducted on several nursing students at Kepanjen University found that 6 out of 10 female students, when interviewed, indicated that most of them used cosmetics because they were influenced by their circle of friends and following popular cosmetic trends on social media. The influence of beauty influencers on social media on students' purchasing intentions was also demonstrated by Chin (2019) and Moon and Jeon (2021). Nursing students should be knowledgeable about the ingredients in the cosmetic products they use. However, in reality, many people are still unaware of the potential risks of using cosmetics containing hazardous ingredients. Based on this background, the author was interested in conducting research aimed at determining the relationship between knowledge levels about hazardous materials and attitudes toward cosmetic choices among nursing students at Kepanjen University.

METHOD

This study employed a quantitative, descriptive-analytical method with a cross-sectional approach. The sample consisted of 173 female students selected using the Proportionate Stratified Random Sampling technique. Data collection was conducted online through a questionnaire containing 30 statements related to their knowledge and attitudes regarding cosmetic product selection. The instrument for students'

knowledge and attitudes regarding product selection has been developed and tested for validity and reliability, as reported by Puspasari and Puspita (2022). Data were analyzed using the chi-square test to determine the relationship between knowledge of hazardous materials and attitudes regarding cosmetic product selection.

RESULTS AND DISCUSSION

The results showed that most respondents had a high level of knowledge (90.8%). However, attitudes toward choosing cosmetics varied, with 58.4% having a favorable attitude and 41.6% having a poor attitude. Statistical tests showed no significant relationship between the level of knowledge regarding hazardous materials and attitudes toward choosing cosmetics (p-value = 0.251; $p > 0.05$).

The majority of nursing students at Kepanjen University, 157 respondents (90.8%), had a good level of knowledge. This study aligns with the research of Fadila et al. (2022) which showed that knowledge about cosmetics among eleventh-grade students majoring in Beauty Treatment at SMKN 7 Padang was 74.21%, which is included in the moderate knowledge category, and higher than the findings. Hanumningtyas et al. (2024) also reported the level of knowledge about cosmetic use, as well as attitudes and behaviors regarding cosmetic use among medical students. Knowledge can be influenced by many factors, one of which is education level: the higher a person's education level, the better their knowledge, and vice versa. Therefore, female students are generally considered to have a higher level of knowledge compared to the general public. Respondents, who are mostly female, tend to be more accustomed to using cosmetics, so they have a higher level of knowledge about cosmetic products. Women tend to consider the advantages and benefits of a product or service before deciding to purchase it, thus they are more careful in choosing products based on the information they have. Lukitasari et al. (2025) found a relationship between the level of knowledge and the accuracy of choosing skin whitening cosmetic products in female students at Brawijaya University, Malang, which shows that in the context of choosing whitening products, knowledge does go hand in hand with the accuracy of choosing.

Although female students possess good knowledge, there are still inappropriate attitudes in choosing cosmetic products. Female students who are knowledgeable about cosmetic selection should choose products according to the rules and correct methods, but they often ignore these rules to achieve the desired results, without considering the side effects of incorrect cosmetic use. There are other factors that influence female students in choosing beauty products, namely social media factors, peer factors, and personal factors. For example, the beauty standard in Indonesia, which is often identified with white skin, can encourage the desire for instant results, thus increasing interest in using cosmetics containing hazardous ingredients (mercury). In contrast to these findings, Susilawati et al. (2022) found a relationship between students' level of knowledge and attitudes regarding the selection and use of skin-whitening cosmetics, and Kartika Sari et al. (2023) found a relationship between students' level of knowledge and attitudes regarding the selection of decorative cosmetics that are safe from hazardous chemicals. These differences in results indicate that the relationship between knowledge and attitudes is not uniform across contexts, and in nursing female students the gap between knowledge and attitudes appears more pronounced.

The majority of nursing students at Kepanjen University (155 respondents) had a positive attitude. This result is in line with the research of Qoriati and colleagues on female pharmacy students who obtained a high attitude category of 88%. This is stated to be high due to various factors that can shape a person's

attitude, including experience, peer invitations, emotional factors, and culture. Mundriyastutik and Habibah (2022) also examined the relationship between knowledge levels and attitudes regarding the selection of facial moisturizers on the skin health of adolescent girls, while Purba et al. (2025) described the varying attitudes and behaviors regarding the use of facial whitening cosmetics among medical students. Based on the high level of cosmetic knowledge among female students, this strengthens the findings from the initial observations of the study which indicated problems in female students' attitudes when choosing cosmetics that do not align with their existing knowledge. Suryani and Apriani (2022) revealed that there were respondents with positive attitudes that were not accompanied by good behavior in choosing safe, non-mercury cosmetics. This is caused by attitudes that are still closed, so they can be influenced by various other factors, such as age and life cycle stage.

Age significantly influences how a person chooses cosmetics, particularly in terms of self-awareness, social influence, purchasing power, and skin needs. In late adolescence, cosmetics are often used to boost self-confidence and follow trends emerging through social media and the surrounding environment. Conversely, older individuals tend to be more selective in choosing products, considering quality, long-term benefits, and the ingredients used. Economic factors also influence these decisions, with late adolescence tending to seek more affordable products, while adults prefer premium products with a focus on skin care. With increasing age, cosmetic preferences increasingly adapt to individual needs and awareness of skin health. Based on the data, respondents in this study were aged 17 to 23, which falls into the late adolescence and early adulthood categories. At this stage, they are still susceptible to various influences that can influence their behavior, so positive attitudes are not always translated into concrete actions.

Based on existing theory, the choice of cosmetics by female students is not only influenced by knowledge, but also by various other more dominant factors, such as cultural factors originating from the environment in which a person grows up. This factor can influence a person's decision in choosing cosmetics, for example by imitating friends or people around them who use similar products. Personal factors also play an important role, where a person's age, life stage, occupation, economic conditions, lifestyle, as well as personality and self-concept can encourage them to choose certain products. In addition, psychological factors also play a role, where a person may ignore the dangerous side effects of the cosmetic products they use because they feel the product is really needed. According to Mukti et al. (2022), there are five tips for choosing safe and healthy cosmetics, namely: first, prioritize improving nutritional intake and improving body circulation; second, understand your skin type (especially the facial area which is more sensitive to cosmetics than other parts of the body); third, choose cosmetic products that suit your skin type and ensure the product has a halal label and has been officially registered with the BPOM; fourth, when choosing cosmetics, pay attention to the order of the composition of the ingredients, the names of the ingredients, and the labels or symbols on the packaging; Fifth, ensure that the product is used and stored correctly according to the instructions.

Based on the results of data analysis using the chi-square test, it was found that there was no significant relationship between the level of knowledge regarding hazardous materials and attitudes in choosing cosmetics among nursing students at Kepanjen University. This is based on the chi-square test which showed a p-value = 0.251 ($p > 0.05$), so H1 was rejected. This is in line with previous research on

pharmacy students, which showed that 88% of respondents had a high level of knowledge and 88% of respondents were in the high attitude category, but the chi-square test obtained a result of 0.122 which indicated there was no relationship between the level of knowledge and attitudes towards the use of cosmetics. Based on the results of this analysis, it can be concluded that the level of knowledge is not a significant factor in determining the attitude of choosing among female students. This means that even though someone has good or sufficient knowledge about hazardous materials in cosmetics, it does not directly influence the attitude of choosing cosmetics in female students. This finding indicates that other factors besides knowledge, such as employment status, social media, family and friends, price, and the influence of halal labels, may be more dominant in determining the attitude of choosing cosmetics in female students.

The role of social media deserves special attention. According to Suryani and Apriani (2022), there is a relationship between social media and the selection of safe cosmetics without mercury. This occurs due to the ease of obtaining information through social media, including information on makeup, skin care, and other things. Social media now serves as an effective marketing platform, thus influencing someone to become a consumer of a product. Product promotion through endorsement advertisements by celebrities or public figures is one factor that increases people's interest in cosmetics through social media, thus impacting their decisions in choosing cosmetic products. International findings support this mechanism: Lim and Lee (2021) showed that parasocial interactions with beauty influencers are related to brand trust and purchase intention, Rathnayake and Lakshika (2023) emphasized the role of social media influencer credibility on purchase intention of beauty products, and Chin (2019) found the influence of influencers in beauty care product advertisements on purchase intention of college students. Currently, more and more celebrities or public figures are concerned about cosmetic safety, so they tend to only promote safe products, encouraging their followers to choose similar products. The same channel can thus work both ways: amplifying risky trends or spreading safe options.

This finding of no association is important because health is at stake. A systematic review by Bastiansz et al. (2022) documented mercury exposure from skin-lightening products and its impacts, Ricketts et al. (2020) reported mercury exposure associated with skin-lightening product use in Jamaica, and Cadungog et al. (2025) assessed the health risks of mercury in skin-lightening cosmetics sold online in several Asian countries. In Indonesia, Handayani et al. (2025) found hydroquinone in online whitening creams. This means that risky products are easily accessible to female students through the same channels they use for everyday information. High levels of knowledge without behavioral change mean that the protection expected from nursing education will not automatically be realized, even though female nursing students will eventually serve as cosmetic safety educators for the public.

From a theoretical perspective, these findings illustrate the widely recognized knowledge-attitude gap in health behavior: knowledge is a necessary, but not sufficient, condition for the formation of attitudes and behaviors. Attitudes are also shaped by social norms, experience, and practical considerations. In the context of halal cosmetics, Najib et al. (2022) demonstrated that knowledge, religiosity, attitudes, and Islamic advertising collectively shape purchase intentions for locally labeled halal cosmetics, while Sugibayashi et al. (2019) outlined the importance of ingredient assurance and testing in halal cosmetics. Yoon and Bae (2024) added that consumer characteristics and consumption values shape attitudes toward

brands. The rapid development of cosmetic science (Erat & Addor, 2025) creates the potential for this gap to widen if education only emphasizes memorizing the names of hazardous ingredients without addressing the consumer decision-making process.

The implications of these findings for nursing education and health promotion are quite straightforward. Interventions should not simply provide information about hazardous materials; they should also target attitudes and norms: practice reading labels and checking BPOM distribution permits, discussions about the pressures of beauty standards and social media trends, and fostering the habit of choosing products according to skin type. Careful consideration of cosmetic choices is essential, based not only on knowledge but also on attitudes that consider the positive and negative impacts of the products they use. Desires influenced by less relevant factors must be overcome with sufficient knowledge, focusing not only on wants and needs but also on an understanding of the product's impact. Therefore, students' poor attitudes toward cosmetic choices need to be improved by applying their existing cosmetic knowledge to everyday decisions.

Several limitations should be noted to ensure these findings are interpreted fairly. The cross-sectional design measured knowledge and attitudes at a single point in time, thus failing to demonstrate changes in attitudes following increased knowledge. The online data collection using a self-report questionnaire opens up the possibility of response bias, including a tendency to respond in accordance with social expectations, particularly among nursing students who knew the correct answers. The study was conducted at a single institution, so generalizations to students at other institutions require caution. Other factors suspected to be more dominant, such as the influence of social media, friends, family, price, and halal labels, were not modeled simultaneously in the analysis, so their individual contributions cannot be measured.

1. CONCLUSIONS AND SUGGESTIONS

Based on the results of an online study conducted on January 4, 2025, at Kepanjen University, it can be concluded that the majority of female students have a good understanding of hazardous ingredients in cosmetics, with a percentage of 90.8%. This indicates that the majority of respondents have sufficient awareness regarding the risky ingredients in the cosmetic products they use. The results also showed that 89.6% of respondents have a positive attitude in choosing cosmetics. Analysis using the chi-square test revealed that there was no significant relationship between the level of knowledge regarding hazardous ingredients in cosmetics and attitudes in choosing cosmetics (p-value = 0.251). In other words, although the level of knowledge of respondents is considered high, this does not necessarily influence their attitudes in choosing cosmetic products. There may be other factors, such as beauty trends, the influence of social media, price, and recommendations from friends or family, which are more dominant in cosmetic selection decisions.

It's recommended that female students proactively seek information about hazardous ingredients in cosmetics from trusted sources such as the official BPOM website, health articles, or education from healthcare professionals. Ensure the cosmetics they use have a BPOM distribution permit and are not expired. Avoid being influenced by cosmetic trends on social media without ensuring their safety. This will allow for wiser and safer cosmetic choices. For educational institutions, these findings highlight the need

for enhanced learning that targets attitudes and skills in product safety assessment, not just knowledge of hazardous ingredients.

For future researchers, it is recommended to identify and model other factors that influence attitudes towards cosmetic choices, such as exposure to social media and influencers, the influence of friends and family, price, and halal labels, with a design that allows testing of the influence path, and involves respondents from several institutions so that the gap between knowledge and attitudes can be explained more fully.

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