

Cosmetic Literacy through a Creative Natural Product-Based Approach for Adolescents in Tangerang

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Abstract

The use of cosmetics among adolescents has increased significantly alongside the rapid growth of the beauty industry. However, several critical issues, such as illegal cosmetics or the misuse of cosmetic products, raise great concern. Adolescents, a growing population with limited literacy regarding product safety, may pose higher health risks. This community service program aimed to improve high school students' knowledge of safe cosmetic use through an experiential learning approach. The activity was conducted with 39 students (64% female, 36% male) from SMA Strada Santo Thomas Aquino in Tangerang. The research design is quasi-experimental using methods included a combination of lectures and a workshop on natural-based lip balm formulation. Participants' knowledge was assessed using a pre-test and post-test to evaluate changes before and after the educational intervention. The results showed an increase in the mean score from 78 on the pre-test to 97 on the post-test. Statistical analysis using a paired t-test demonstrated that this improvement was statistically significant ($p < 0.05$). The proportion of participants in the very good category increased substantially from 7.69% to 76.92%. In addition, the satisfaction survey indicated high participant satisfaction, with more than 70% rating the overall implementation of the program as very good, including the quality of educational delivery, topic relevance, practical applicability, and time allocation. In conclusion, the creative, natural-product-based educational program effectively improved cosmetic literacy among adolescents and achieved a high level of participant satisfaction. This approach may serve as an effective strategy for adolescences education.

Keywords

adolescents; community service; cosmetic safety; lip balm; workshop



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1. INTRODUCTION

Cosmetics were first known in the early century; various parts of the world have long histories of cosmetics. Egyptians used soap for bathing or as perfume to enhance their attractiveness. They even use a mixture of powdered lime and animal fat or vegetable oil as a cleansing cream. Chinese culture also shows a great tradition of herbal dermatology herbal preparations (McMullen & Dell'Acqua, 2023). Nowadays, cosmetics have evolved beyond merely serving as tools for enhancing appearance, as they are now closely associated with skin health, mental well-being, and self-confidence. The cosmetic industry continues to expand its product development, encompassing not only decorative cosmetics but also skincare, multifunctional cosmetics, and green cosmetics (Ustymenko, 2023). Cosmetic usage has increased globally over the past decade. Based on studies conducted in South Korea, the proportion of users ranges from adolescents to adults, with a predominance among females (Brancu & Turcu, 2025; Park et al., 2018). Indonesia has shown a similar trend as the fastest-growing market in Asia. The cosmetic industry has become an emerging market with projected growth at a compound annual growth rate (CAGR) of 7.5% from 2021 to 2027 (Kashuri et al., 2025). However, increased use is not always accompanied by adequate user safety awareness.

Along with this increasing trend, a critical issue that has emerged is the availability of illegal cosmetic products. The distribution of legal cosmetics in Indonesia is regulated by the Food and Drug Supervisory Agency (BPOM). As the national regulatory authority, BPOM is responsible for both pre-market authorization and post-market surveillance of various products, including cosmetics. During the pre-market stage, BPOM issues a marketing authorization number to certify that a cosmetic product has met the required standards of safety, quality, and efficacy. Only cosmetic products that have obtained a valid marketing authorization number are permitted to be marketed in Indonesia. However, cosmetic products without a marketing authorization number are still widely found in the community. This condition poses a risk to public safety, particularly as some of these products contain hazardous substances (Mahagung & Hamimah, 2023). In addition, the variability of human skin conditions poses risks of irritation, allergic reactions, or even organ damage from inappropriate cosmetic use (Chen & Li, 2022; Mahagung & Hamimah, 2023; Martins et al., 2022). Furthermore, some cosmetic ingredients pose significant health risks. One of the most concerning is hydroquinone, an aromatic organic compound used as a skin-lightening agent by inhibiting melanin production. It is widely recognized as an effective treatment for melasma and other hyperpigmentation

disorders. However, prolonged use of hydroquinone may cause adverse effects, including irritant dermatitis, contact dermatitis, melanocyte damage, exogenous ochronotic, and an increased risk of carcinogenesis. Its metabolites, such as p-benzoquinone and glutathione conjugates, have been associated with DNA damage and mutations. Long-term use of hydroquinone-containing cosmetic products may therefore increase the risk of cancer. As a result, many countries have imposed strict regulations or restrictions on the use of hydroquinone in cosmetic products (Bamidele et al., 2023; Handayani et al., 2025). Heavy metals represent another major safety concern in cosmetic products. Mercury may be present in elemental, organic, or inorganic forms. Mercury salts have historically been added to skin-lightening products due to their ability to inhibit tyrosinase activity and suppress melanin production. Despite this effect, mercury exposure is associated with serious adverse health outcomes, including gastrointestinal toxicity, liver and kidney damage, central nervous system disorders, and carcinogenic effects (Bamidele et al., 2023; Choi et al., 2026).

Adolescents, as one of the primary user groups of cosmetics, represent a vulnerable population to these issues. Individuals in this age group begin using cosmetics to enhance their appearance. Based on the study from Kurian in 2025 almost 50% of adolescents and pre-teens using make-ups (Kurian, 2025). However, several studies have reported that adolescents possess limited knowledge regarding cosmetic products. This lack of knowledge may increase the risk of using non-compliant or unsafe cosmetic products, potentially leading to adverse health effects (Ramadhani & Erwiyani, 2024). Previous educational activities conducted at SMA Santa Patricia reported a relatively low mean pre-test score of 58.9, which increased to 74.9 following the intervention. Similar findings were observed in a community service program at SMAK 6 Penabur Pluit, where nearly 40% of students demonstrated low levels of knowledge related to cosmetics (Christian et al., 2026; Rachmawati et al., 2025). These findings indicate a gap between the widespread use of cosmetic products and adolescents' cosmetic literacy, highlighting the need for educational interventions to promote safe, informed cosmetic use. Therefore, adolescents were selected as the target group in this activity. This community service program aimed to improve cosmetic literacy among high school students by increasing their knowledge of cosmetic safety, hazardous ingredients, and the appropriate selection and use of cosmetic products.

The problem-solving approach is conducted through educational interventions using lecture methods combined with workshops. Experiential learning is based on

the principle that individuals learn most effectively through direct experience. Rooted in the philosophy of learning by doing, Kolb's Experiential Learning Theory describes learning as a cyclical process consisting of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation (Villarroel Henríquez et al., 2025). This method has been shown to significantly enhance understanding of specific topics (Rahmi, 2024). This has been demonstrated in various educational activities, particularly those that integrate workshops and lectures, which are effective at improving participants' comprehension. A similar approach, combining education and workshops, has also been applied to secondary school students on lip and hair health, yielding satisfactory outcomes (Arrang et al., 2025; Susanto et al., 2026).

This study offers a novel integration of cosmetic education with natural-based product development. Based on this background, this activity is expected not only to improve adolescents' understanding of cosmetic safety but also to foster more critical attitudes in selecting and using standardized cosmetic products. The integration of lecture and workshop methods as a form of experiential learning is expected to provide a more comprehensive and applicable understanding. Thus, this activity has the potential to be an effective educational approach to raise awareness and promote safe cosmetic use among adolescents.

2. METHODS

This study employed a quasi-experimental one-group pretest-posttest design. The community service program was conducted with adolescent participants as the target group. The program was implemented among students of SMA Strada Santo Thomas Aquino as the partner institution. During the implementation, the partner actively participated in both the educational session and the workshop. In addition, the partner served as the venue provider for the educational and workshop activities. This study has already obtained permission from the school and informed consent from the participant.

In general, the implementation of the program was divided into three stages: preparation, implementation, and evaluation. The preparation stage included an initial survey conducted through a site visit to the partner institution to obtain a comprehensive understanding of the environmental conditions and participant characteristics. The questionnaire was developed by the research team and reviewed for clarity and relevance before implementation. Furthermore, this stage also involved program planning, including the development of educational materials, team briefing, preparation of facilities and infrastructure, and the design of evaluation instruments.

The program was held on Friday, November 21, 2025, at SMA Strada Santo Thomas Aquino in Tangerang, Indonesia, and was attended by 39 participants. The implementation consisted of two main activities: cosmetic literacy education and a hands-on workshop on the preparation of natural lip moisturizers. The educational session covered topics including cosmetic safety, ingredient selection, product labeling, and proper use of cosmetic products. The workshop introduced a natural product-based lip moisturizer formulation containing aloe vera extract (*Aloe vera*) and roselle extract (*Hibiscus sabdariffa*) as active ingredients. Glycerin was used as a humectant, while *cera alba* (beeswax), lanolin, and cocoa butter (*oleum cacao*) served as the formulation's base components. Methyl paraben was incorporated as a preservative to maintain product stability and prevent microbial contamination. During the workshop, participants were guided through the formulation process, including ingredient preparation, mixing, heating, molding, and packaging of the final product.

The program also included pre- and post-tests to evaluate the achievement of program objectives, particularly improvements in participants' knowledge. In addition, participant satisfaction was evaluated using a questionnaire assessing satisfaction with the materials, delivery, and perceived benefits of the educational session and workshop. Direct observation was also conducted to assess participant engagement and enthusiasm throughout the activities.

The evaluation stage included processing participant demographic data and analyzing pre- and post-test results. The pre-test and post-test scores were analyzed statistically using Minitab 19. A normality test was conducted using the Shapiro–Wilk test. Depending on the distribution of the data, either a paired t-test (for normally distributed samples) or a Wilcoxon signed-rank test (for non-normally distributed samples) was performed to determine the significance of changes in participants' knowledge. The program was considered successful if a statistically significant improvement in knowledge was observed. In addition to statistical significance, the mean difference between the pre-test and post-test scores was calculated to assess the magnitude of knowledge improvement. Furthermore, satisfaction survey data were analyzed, and the program was deemed successful if the average satisfaction score exceeded 3 on a 1–5 scale.

3. FINDINGS AND DISCUSSION

The community service activity was participated in by a total of 39 students of SMA Strada Santo Thomas Aquino. All participants were aged 17 years, with a gender distribution as shown in Figure 1. As shown in Figure X, the participants were

predominantly male, comprising 25 males (64%; orange section) and 14 females (36%; blue section). Further analysis of the influence of gender on cosmetic literacy will be discussed later in this section.

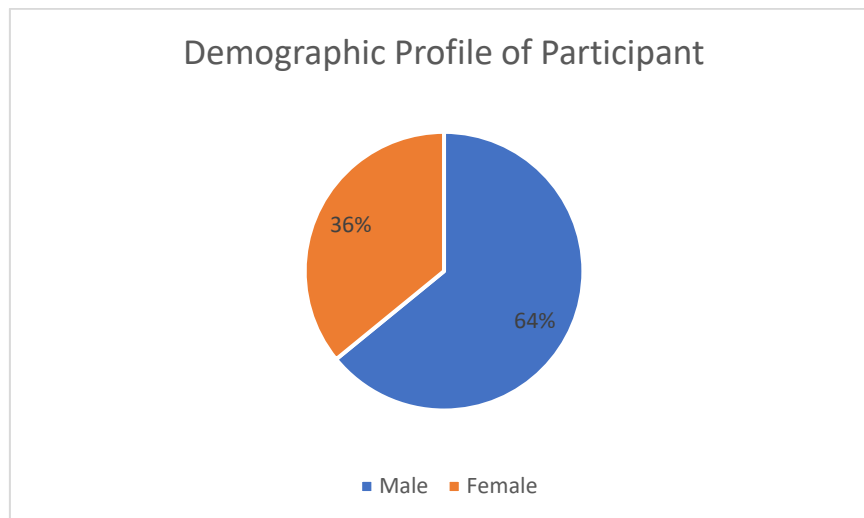


Figure 1. Demographic Profile of Participants

3.1. Safety Cosmetic Literacy Education

The activity was divided into two sessions: a lecture and a workshop. The activity began with an assessment through a pre-test. The pre-test consisted of 10 questions, each worth 10 points, for a total of 100 points. Subsequently, a socialization session was conducted covering general information on cosmetics and various issues related to their distribution and use in the community. A question-and-answer segment complemented the session to facilitate discussion among participants. Participant enthusiasm was reflected in the high number of questions (> 5 questions) related to cosmetics, indicating strong interest among adolescents. This is closely associated with adolescent cognitive patterns, which increasingly emphasize appearance enhancement, including through the use of cosmetic products (Insan & Vera, 2021; Nofita et al., 2025; Sutinah & Nabila Putri, 2024).

3.2. Workshop of Natural-based Lip Balm

Lip balm moisturizes the skin of the lips and protects it from environmental and internal factors (Pawar et al., 2021). This preparation has become part of daily personal care. In addition, the trend of using natural ingredients in cosmetics continues to increase (McMullen & Dell'Acqua, 2023). Therefore, a natural lip balm was selected as the formulation prepared in the second-session workshop. A natural-based product was selected because of the growing interest in natural cosmetics and its simple formulation process, allowing participants to easily reproduce the product and

actively engage in the learning experience. The lip balm was formulated using natural ingredients, namely aloe vera and rosella. Aloe vera is recognized as a natural moisturizer, with Rosella serving as an antioxidant (Insan & Vera, 2021; Maretta Ariestanti et al., 2023). The workshop also served as an experiential learning activity that reinforced participants' cosmetic literacy by enabling them to identify the functions of cosmetic ingredients, understand the rationale behind formulation selection, and recognize the importance of product safety and regulatory compliance in cosmetic production. Through direct observation of the formulation process, participants were able to connect theoretical concepts presented during the educational session with practical applications, thereby enhancing their understanding of safe and informed cosmetic use. The formulation prepared in this workshop was intended to illustrate the preparation process. It was not intended for direct use by participants, as it must be manufactured in industries certified with Grade A standards (Peraturan Menteri Kesehatan Republik Indonesia Nomor 1175/MENKES/PER/VIII/2010 Tentang Izin Produksi Kosmetika, 2010). The participant's involvement in mixing during the workshop session is shown in Figure 2.



Figure 2. Participants' Involvement in the Mixing Process During the Workshop

The post-test was conducted at the end of the activity to assess changes in participants' knowledge following the lecture and workshop sessions. The results of the pre-test and post-test are presented in Figure 3. These scores were further classified into five categories as shown in Table 1 (Susanto et al., 2025). The proportion of participants in the "very good" knowledge category increased to 76.92% from 7.92%. No participants were categorized as having "very poor" knowledge in either the initial or final assessment. Participants with poor knowledge levels showed a significant decrease after the intervention, including both the educational session and workshop. Similar trends were observed in the moderate and good knowledge categories. The

complete distribution of the pre-test and post-test comparison is presented in Figure 3. An increase in the average score was also observed, with the mean pre-test score of 78 rising to 97 in the post-test. There were no differences in the average pre-test and post-test scores between male and female participants. The mean pre-test score was 77 for male participants and 78 for female participants, while the mean post-test scores were 96 and 97, respectively. These findings indicate that gender did not influence participants' knowledge of cosmetic literacy in this study.

Table 1. Knowledge Category based on Assessment Results

Category	Assessment Result
Very poor	0 – 20
Poor	20.1 – 40
Moderate	40.1 – 60
Good	60.1 – 80
Very Good	80.1 – 100

Further statistical analysis was conducted to determine the significance level of changes in participants' knowledge. The data were normally distributed, as indicated by the Shapiro–Wilk test ($p = 0.078$). Therefore, differences between pretest and post-test scores were analyzed using a paired t-test. This method provides statistical significance values for the same group before and after the intervention (Nurba'id et al., 2024). The calculated p-value from the pre-test and post-test data was < 0.05 , indicating a statistically significant change in participants' knowledge. This finding demonstrates the effectiveness of the program in improving participants' knowledge. These results are consistent with previous community service activities. Educational programs on cosmetics combined with perfume-making workshops targeting high school students have also shown statistically significant improvements in post-test scores (Christian et al., 2026; Wulandari et al., 2026).

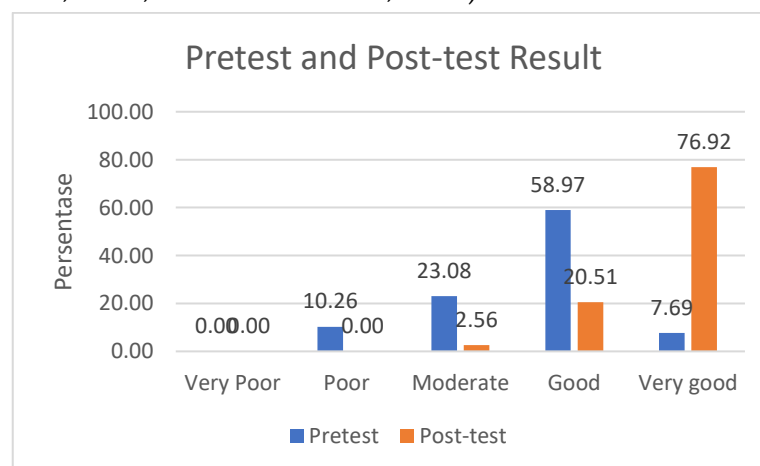


Figure 3. Comparison of Pre-Test and Post-Test Scores Among Participants

Participant satisfaction with the activity was evaluated using a 5-item survey covering clarity of the material explanation, relevance of the material, benefits of the activity, timing of implementation, and overall evaluation. The distribution of the satisfaction survey results is presented in Figure 4. The delivered material was rated as very good by more than 50% of participants, with an average score of 4.54. Similar results were observed for the perceived benefits of the activity and the relevance of the material, both achieving average scores above 4.5. The timing of the activity was also considered appropriate by more than 50% of respondents. Overall, 77% of participants reported being very satisfied, with an average score of 4.77. The high satisfaction scores may also reflect the effectiveness of the experiential learning approach employed in the program, where participants not only received theoretical information but also actively engaged in a hands-on lip balm formulation workshop. Such direct learning experiences can increase participant engagement, facilitate understanding of cosmetic safety concepts, and enhance the perceived relevance and usefulness of the educational content.

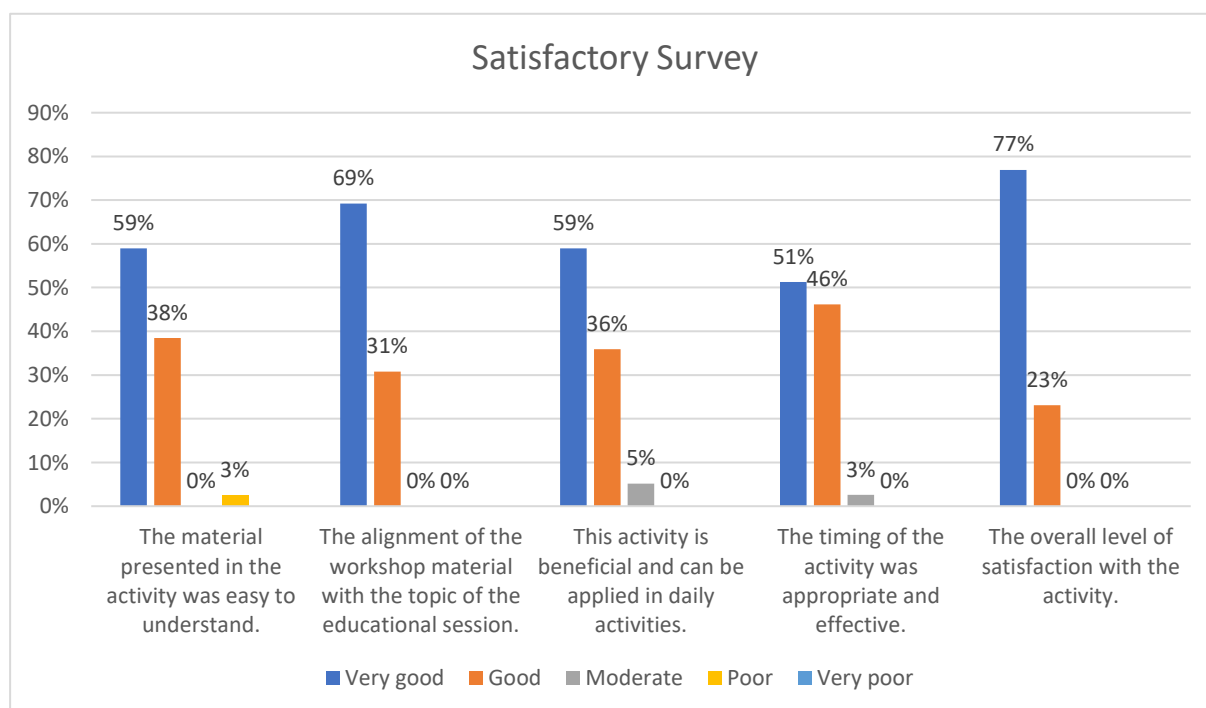


Figure 4. Participant Satisfaction Survey for the Community Service Program

Based on the implementation results, it can be concluded that an educational approach combining lectures and experiential workshops is effective in improving students' knowledge and awareness of the safe use of cosmetics. This is evidenced by the significant increases in pre- and post-test results, as well as the high level of participant satisfaction with the activities implemented. In addition, participant

enthusiasm throughout the activity indicates that cosmetic literacy is highly relevant among adolescents. Thus, this activity not only provides cognitive impact but also has the potential to foster more critical and informed attitudes in selecting and using cosmetic products in daily life. The program provided benefits in the form of increased awareness among students regarding cosmetic safety, as well as the application of acquired knowledge in daily practice. In the future, similar approaches can be further developed and sustainably implemented to reach a broader adolescents population as a preventive effort against the risks associated with improper cosmetic use.

This study has several limitations. The program involved a relatively small sample size from a single educational institution, which may limit the generalizability of the findings. In addition, the study employed a one-group pretest–posttest design without a control group; therefore, the observed improvement in knowledge cannot be attributed solely to the intervention. The assessment was conducted immediately after the educational and workshop sessions, preventing evaluation of long-term knowledge retention and behavioral changes related to cosmetic use. Furthermore, the questionnaire was developed specifically for program evaluation purposes and was not subjected to formal validity and reliability testing. Despite these limitations, the findings suggest that cosmetic literacy education and hands-on workshops may be effective components of school-based health promotion programs, helping adolescents identify safe and legal cosmetic products, understand cosmetic ingredients and formulation principles, and make informed decisions about cosmetic use. Future research should involve larger, more diverse participant populations, incorporate control groups or quasi-experimental designs, use validated assessment instruments, and examine the long-term impact of cosmetic literacy interventions on knowledge retention and cosmetic-use behaviors.

4. CONCLUSION

The cosmetic literacy training activity conducted among adolescents, using a combination of lectures and a natural-based lip balm workshop, was shown to improve participants' knowledge of the safe use of cosmetics. The improvement was indicated by an increase in the mean score from 78 to 97, a statistically significant paired t-test ($p < 0.05$), and a shift in knowledge categories toward higher levels. Survey results also demonstrated a high level of participant satisfaction with the activity's implementation. Therefore, an experiential-based educational approach is effective in enhancing cosmetic literacy among adolescents. The integration of cosmetic safety education with hands-on formulation activities using natural ingredients represents a practical and engaging approach that may be applied in other

school-based educational programs. However, the findings should be interpreted with caution due to the relatively small sample size, the absence of a control group, and the assessment being limited to short-term knowledge outcomes. Future studies should include larger and more diverse populations, comparison groups, and evaluation of long-term effects on attitudes and safe cosmetic-use behaviors.

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