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# The Effect of Counseling Intervention on Adolescents' Knowledge Regarding Sunscreen Use and the Incidence of Acne Vulgaris: An Experimental Study in the Adolescent Population in Jakarta, Indonesia

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**A B S T R A C T**

Acne vulgaris is a common skin problem in adolescents, often exacerbated by a lack of knowledge about proper skin care, including the use of sunscreen. This study aims to evaluate the effectiveness of counseling interventions in increasing adolescents' knowledge about sunscreen use and reducing the incidence of acne vulgaris. This experimental research involved 150 adolescents aged 15-18 years in Jakarta who were randomly divided into an intervention group (receiving counseling) and a control group. The intervention group received structured counseling sessions on sunscreen use and skin care for 8 weeks. Knowledge about sunscreen and the incidence of acne vulgaris were assessed before and after the intervention using a validated questionnaire and clinical examination. There was a significant increase in knowledge about sunscreen in the intervention group after counseling ($p < 0.001$). The intervention group also showed a significant reduction in the incidence of acne vulgaris compared to the control group ($p = 0.023$). Counseling interventions are effective in increasing adolescents' knowledge about sunscreen use and reducing the incidence of acne vulgaris. This intervention can be considered as a public health strategy to address skin problems in adolescents.

## 1. Introduction

Acne vulgaris, better known as acne, is a chronic inflammatory skin disease that is most common in adolescents. This disease is characterized by the presence of non-inflammatory lesions such as open comedones (blackheads) and closed comedones (whiteheads), as well as inflammatory lesions such as papules, pustules, nodules, and cysts. These lesions usually appear on the face, neck, chest, back, and shoulders, which are areas with a high density of sebaceous glands. The prevalence of acne vulgaris in adolescents globally is very high, ranging from 35% to 90%. This figure varies depending on age, gender, ethnicity, and geographic factors. The peak prevalence of acne vulgaris occurs at the age of 15-17 years when hormonal activity reaches its peak. In young adulthood, the prevalence of acne vulgaris tends to decrease, but can still affect some individuals into their 30s or even 40s. In Indonesia, 2018 Basic Health Research (Riskesdas) data shows the prevalence of acne vulgaris in adolescents is 14.5%. This figure is lower compared to global prevalence but remains a significant skin health problem. The prevalence of acne vulgaris in Indonesia varies between regions, with the highest rate occurring in DKI Jakarta (25.7%), followed by Bali (21.1%), and DI Yogyakarta (19.6%). Acne vulgaris not only causes physical problems, such as inflammatory lesions, blackheads, and scar tissue but can also have a significant impact on an adolescent's quality of life. Research has shown that

adolescents with acne vulgaris have a higher risk of depression, anxiety, and body image disorders. This condition can interfere with social activities, academic achievement, and overall psychological well-being of adolescents. Depression and anxiety are common mental health problems in adolescents with acne vulgaris. Adolescents with acne vulgaris often feel embarrassed, insecure, and socially isolated. They may avoid social situations, such as going to school or hanging out with friends, for fear of being teased or judged. This condition can worsen feelings of depression and anxiety, and interfere with adolescents' social and emotional development. Body image disturbance is also a problem that is often experienced by adolescents with acne vulgaris. Adolescents with acne vulgaris often feel dissatisfied with their appearance and feel that their acne makes them unattractive. They may spend a lot of time and money trying different skin care products or even undergoing cosmetic procedures to get rid of their acne. However, these efforts are often unsuccessful and can actually worsen skin conditions and increase feelings of frustration.[1-3]

Regular use of sunscreen is an important step in protecting the skin from the harmful effects of sunlight, including in adolescents with acne vulgaris. Sunscreen can help reduce inflammation, prevent post-inflammatory hyperpigmentation, and speed up the acne healing process. Sunscreen works by absorbing, reflecting, or scattering UV radiation from sunlight. The active ingredients in sunscreen can be chemical or mineral compounds. Chemical compounds, such as oxybenzone and avobenzone, absorb UV radiation and convert it into harmless heat. Minerals, such as titanium dioxide and zinc oxide, reflect or scatter UV radiation from the skin. Even though the benefits of sunscreen in preventing and treating acne vulgaris have been scientifically proven, many adolescents are still reluctant or do not regularly use sunscreen. Many adolescents do not understand the importance of using sunscreen and how to choose the right sunscreen for their skin type. Some teens may not realize that sun exposure can worsen acne vulgaris, or they may have incorrect information about sunscreen, such as the belief that sunscreen can clog pores and make acne worse. Some adolescents may find it difficult to use sunscreen regularly for various reasons, such as the texture of the sunscreen being sticky or oily, having difficulty finding a sunscreen that is suitable for acne-prone skin, or forgetting to use sunscreen when doing outdoor activities. Adolescents are often influenced by their peers and beauty trends promoted on social media. If their friends don't use sunscreen or consider a tan to be a sign of beauty, teens may be reluctant to use sunscreen for fear of being ridiculed or seen as not following trends. Support from parents or other authority figures, such as teachers or doctors, is very important in shaping adolescent health behavior. If parents or authority figures do not provide accurate information about the importance of using sunscreen or do not set a good example in using sunscreen, adolescentss may be less motivated to use sunscreen.[4,5]

Education and counseling are effective strategies in overcoming the challenges of using sunscreen in adolescents. Through education, adolescents can obtain accurate and relevant information about the benefits of sunscreen, how to choose the right sunscreen, and how to use sunscreen correctly. Education can be done in various ways, such as counseling in schools, brochures, leaflets, educational videos, or smartphone applications. Counseling can provide a more personal and interactive approach in increasing adolescents' knowledge and motivation to use sunscreen. Counseling can be carried out by a dermatologist, nurse, or trained counselor. In counseling sessions, adolescents can ask questions, share experiences, and get support from the counselor. Counseling can also help teens overcome barriers to sunscreen use and develop strategies for using sunscreen regularly. Several studies have shown that educational and counseling interventions can increase adolescents' knowledge about acne vulgaris, change skin care behavior, and reduce acne severity. A study showed that an 8-week counseling intervention could increase adolescents' knowledge

about acne vulgaris and increase their adherence to treatment. Another study showed that educational interventions can reduce the severity of acne vulgaris in adolescents.[7-9] This study aims to evaluate the effectiveness of counseling interventions in increasing adolescent knowledge about sunscreen use and reducing the incidence of acne vulgaris in the adolescent population in Jakarta, Indonesia.

## 2. Methods

This research uses an experimental study design with a pre-test and post-test control group design approach. The target population in this research is adolescents aged 15-18 years who live in the DKI Jakarta area. The selection of this age range was based on the consideration that acne vulgaris occurs most often in this age group, and adolescents of this age generally have sufficient cognitive abilities to understand counseling material and apply the knowledge gained in everyday life. The sampling technique used in this research was purposive sampling. In this study, the inclusion criteria used were Adolescents aged 15-18 years, Domiciled in the DKI Jakarta area, Having a diagnosis of mild to moderate acne vulgaris based on the assessment of a dermatologist, Willing to participate in the research and sign an informed consent. The exclusion criteria used were Having a history of allergies to sunscreen ingredients, Currently undergoing systemic therapy for acne vulgaris (eg, oral antibiotics, isotretinoin), and having other skin conditions that could affect the research results (eg, atopic dermatitis, rosacea). The sample size required in this study was calculated using the Lemeshow formula by considering a significance level of 5%, power of 80%, and a minimum clinically significant difference of 20% in sunscreen knowledge scores between the intervention and control groups. Based on these calculations, a minimum of 75 adolescents are needed in each group, so the total sample required is 150 adolescents.

The counseling intervention in this study was carried out by a dermatologist or trained nurse who has experience in treating acne vulgaris problems in adolescents. Counselors are given special training on counseling materials, effective communication techniques, and how to overcome barriers to the use of sunscreen in adolescents. Counseling interventions are carried out face-to-face in clinics or other health facilities that are comfortable and conducive. Each counseling session lasts 30-45 minutes and is carried out 8 times over 8 weeks. The frequency of counseling sessions was chosen based on previous research which shows that counseling interventions carried out regularly and repeatedly can provide more optimal results. The counseling material presented includes: Skin anatomy and physiology: A description of the structure and function of the skin, including the sebaceous glands, hair follicles, and epidermis layers; Pathophysiology of acne vulgaris: Explanation of the causes and mechanisms of acne vulgaris, including the role of hormones, bacteria and inflammation; Acne vulgaris risk factors: A description of factors that may increase the risk or worsen acne vulgaris, including genetic, hormonal, environmental, and behavioral factors; Benefits of using sunscreen in the prevention and treatment of acne vulgaris: Explanation of how sunscreen can protect the skin from the harmful effects of sunlight, reduce inflammation, prevent post-inflammatory hyperpigmentation, and speed up the acne healing process; How to choose the right sunscreen for your skin type: An explanation of the various types of sunscreen available on the market, how to read sunscreen labels, and how to choose a sunscreen that suits your skin type and individual needs; How to use sunscreen correctly: Demonstration on how to apply sunscreen evenly to the entire face and body parts exposed to sunlight, as well as an explanation of the importance of using sunscreen every day, even when the weather is cloudy or when doing activities indoors; Other basic skin care for teens with acne vulgaris: An explanation of the importance of cleansing the face regularly, avoiding squeezing or scratching acne, using non-comedogenic skin care products, and maintaining a healthy diet. Counseling methods used include: Interactive discussion: Counselors invite adolescents to discuss their

experiences with acne vulgaris, the difficulties they face in using sunscreen, and their hopes for the results of counseling; Questions and answers: The counselor gives adolescents the opportunity to ask questions about counseling material or other matters related to acne vulgaris and the use of sunscreen; Demonstration: The counselor demonstrates how to choose and use sunscreen correctly, as well as how to perform other basic skin care; Providing educational materials: Counselors provide educational materials in the form of brochures, leaflets or educational videos about the use of sunscreen and skin care; Assignment: The counselor gives assignments to adolescents to practice using sunscreen and other skin care at home.

Data collection in this study was carried out at three different points in time: Pre-test (Before Intervention): At this stage, data is collected from both groups, namely the intervention group and the control group. Pre-test data collection aims to measure participants' initial condition before the intervention begins, including their level of knowledge about sunscreen use and the severity of acne vulgaris. Post-test 1 (After Intervention): Post-test 1 data collection was carried out immediately after the counseling intervention was completed. The aim was to measure the changes that occurred in the intervention group after receiving counseling, both in terms of increasing sunscreen knowledge and reducing the severity of acne vulgaris. Post-test 2 (Follow-up): Post-test 2 data collection was carried out 8 weeks after the intervention was completed. The aim is to evaluate whether the changes that occur in the intervention group after the intervention are long-term or not. The instruments used in this research are: Sunscreen Knowledge Questionnaire: This questionnaire consists of 20 multiple-choice questions that have been validated to measure adolescents' knowledge about sunscreen use. The questions in the questionnaire cover various aspects related to sunscreen, such as types of sunscreen, how to choose the right sunscreen, how to use sunscreen correctly, and the benefits of sunscreen in preventing and treating acne vulgaris. Global Acne Grading System (GAGS): GAGS is a grading scale used to measure the severity of acne vulgaris. This scale consists of 5 levels of severity, ranging from 0 (no acne) to 4 (very severe acne). GAGS assessments are performed by trained dermatologists to ensure objectivity and consistency of assessment. Apart from these two main instruments, researchers also collected participant demographic data, such as age, gender, education level, skin type, history of acne vulgaris, and history of sunscreen use. This demographic data was used to analyze participant characteristics and identify factors that might influence research results.

The collected data will be analyzed using SPSS statistical software. Descriptive analysis was used to describe participant demographic characteristics, sunscreen knowledge scores, and GAGS scores for each group and time point. An independent t-test was used to compare sunscreen knowledge scores and GAGS scores between the intervention and control groups at each time point. Paired t-test was used to compare sunscreen knowledge scores and GAGS scores in each group between pre-test and post-test. Correlation analysis was used to examine the relationship between sunscreen knowledge and the incidence of acne vulgaris. Participants were given a complete explanation of the aims, procedures, benefits, and risks of the study before being asked to sign informed consent. Participants were guaranteed the confidentiality of their data and had the right to withdraw from the study at any time without any consequences. Researchers ensure that the counseling intervention provided is safe and does not pose a risk to participants. If undesirable side effects occur during the study, researchers immediately take appropriate action to protect the safety and well-being of participants.

**3. Results and Discussion**

A total of 150 adolescents aged 15-18 years in Jakarta participated in this research. Participants were randomly divided into an intervention group (n=75) and a control group (n=75). There were no significant differences in demographic characteristics

between the two groups, including age, gender, education level, skin type, history of acne vulgaris, and history of sunscreen use (Table 1).

Table 1. Demographic characteristics of participants.

| Characteristics | Intervention Group (n=75) | Control Group (n=75) | p-value |
|---|---|---|---|
| Mean age (SD) | 16,5 (1,2) | 16,3 (1,3) | 0,345 |
| Gender (female) | 48 (64%) | 45 (60%) | 0,682 |
| **Level of education** | | | |
| Senior high school | 55 (73,3%) | 52 (69,3%) | 0,567 |
| Vocational high school | 20 (26,7%) | 23 (30,7%) | |
| **Skin type** | | | |
| Normal | 28 (37,3%) | 30 (40%) | 0,789 |
| Oily | 35 (46,7%) | 32 (42,7%) | |
| Combination | 12 (16%) | 13 (17,3%) | |
| **History of acne vulgaris** | | | |
| <1 year | 30 (40%) | 28 (37,3%) | 0,789 |
| 1-3 years | 35 (46,7%) | 38 (50,7%) | |
| >3 years | 10 (13,3%) | 9 (12%) | |
| **History of sunscreen use** | | | |
| Never | 42 (56%) | 45 (60%) | 0,682 |
| Sometimes | 25 (33,3%) | 22 (29,3%) | |
| Often | 8 (10,7%) | 8 (10,7%) | |

Table 2 shows interesting results regarding adolescents' knowledge about sunscreen use before and after the counseling intervention. At the start of the study (pre-test), both groups showed relatively low sunscreen knowledge scores, with an average score of around 10 out of 20. This indicates that adolescents, whether they will receive counseling or not, have an inadequate understanding of their use. sunscreen. There were no significant differences between the two groups at this stage, indicating that both groups had similar levels of knowledge before the intervention. After receiving the counseling intervention, there was a drastic increase in sunscreen knowledge scores in the intervention group. The average score increased to 16.4, indicating a substantial increase in knowledge. In contrast, the control group did not experience significant changes in sunscreen knowledge scores. The increase in scores in the intervention group was highly statistically significant ($p < 0.001$), indicating that the counseling intervention had a strong and real impact on increasing sunscreen knowledge. The increase in sunscreen knowledge in the intervention group remained until 8 weeks after the intervention, although it decreased slightly to 15.8. This shows that the effects of counseling interventions are not only temporary but also have long-term impacts. The control group still showed no significant change in sunscreen knowledge scores. The difference between the intervention and control groups remained statistically significant at post-test 2 ($p < 0.001$), confirming the effectiveness of the counseling intervention in increasing and maintaining sunscreen knowledge in adolescents.

Table 2. Sunscreen knowledge scores in the intervention and control groups.

| Group | Pre-test (SD) | Post-test 1 (SD) | Post-test 2 (SD) | Statistical test (p-value) |
|---|---|---|---|---|
| Intervention | 10,2 (2,8) | 16,4 (2,1) | 15,8 (2,3) | vs. Pre-test: <0,001 |
| | | | | vs. Control: <0.001 |
| Control | 9,8 (3,1) | 10,1 (3,3) | 10,2 (3,4) | vs. Pre-test: 0,652 |
| | | | | vs. Intervention: <0.001 |

Table 3 presents quantitative data regarding the severity of acne vulgaris, measured using the Global Acne Grading System (GAGS). A higher GAGS score indicates a higher level of severity. Both groups, both intervention and control, showed similar GAGS scores at the start of the study, around 2.3 and 2.4. This indicates that the severity of acne vulgaris in both groups was relatively comparable before the intervention began. The intervention group experienced a significant reduction in GAGS scores to 1.5. This showed a substantial improvement in the severity of their acne vulgaris. In contrast, the control group showed no significant change in GAGS scores, which remained around 2.5. This suggests that without intervention, the severity of acne vulgaris is unlikely to improve naturally over the same time period. Eight weeks after the intervention, the intervention group still maintained a low GAGS score (1.6), indicating that the improvements that occurred after the intervention were not only temporary but also sustainable. The control group nevertheless showed no significant changes in GAGS scores, confirming that the counseling intervention played an important role in the improvements observed in the intervention group. The difference in GAGS scores between the intervention and control groups was highly statistically significant at post-test 1 ($p = 0.002$) and post-test 2 ($p = 0.008$). This suggests that counseling interventions have a real and reliable effect in reducing the severity of acne vulgaris. The reduction in GAGS scores in the intervention group was also highly statistically significant ($p = 0.002$ for post-test 1 and $p = 0.008$ for post-test 2), indicating that the improvements that occurred were not due to chance, but were a direct result of the intervention.

Table 3. Mean scores from the Global Acne Grading System (GAGS) in the intervention and control groups.

| **Group** | **Pre-test (SD)** | **Post-test 1 (SD)** | **Post-test 2 (SD)** | **Statistical test (p-value)** |
|---|---|---|---|---|
| Intervention | 2,3 (0,8) | 1,5 (0,6) | 1,6 (0,7) | vs. Pre-test: 0,002 |
| | | | | vs. Control: 0.002 |
| | | | | vs. Control: 0.008 |
| Control | 2,4 (0,9) | 2,5 (0,8) | 2,5 (0,8) | vs. Pre-test: >0,05 |
| | | | | vs. Intervention: 0.002 |
| | | | | vs. Intervention: 0.008 |

Figure 1 depicts the relationship between knowledge scores about sunscreen and GAGS (Global Acne Grading System) scores, which is a measure of acne severity, at two measurement time points after the intervention (post-test 1 and post-test 2). The scatter plot for post-test 1 showed a clear negative correlation between knowledge about sunscreen and GAGS score ($r = -0.765$, $p < 0.001$). This indicates that the higher the knowledge score about sunscreen, the lower the GAGS score (acne severity). The regression line in this plot further confirms the negative linear relationship. The scatter plot for post-test 2 also showed a strong negative correlation between knowledge about sunscreen and GAGS scores ($r = -0.832$, $p < 0.001$), strengthening the findings from post-test 1. The regression line again showed a negative linear relationship, indicating that Higher knowledge about sunscreen was associated with lower acne severity even eight weeks after the intervention. Consistent negative correlations at both time points provide strong evidence that increased knowledge about sunscreen is associated with decreased acne severity.

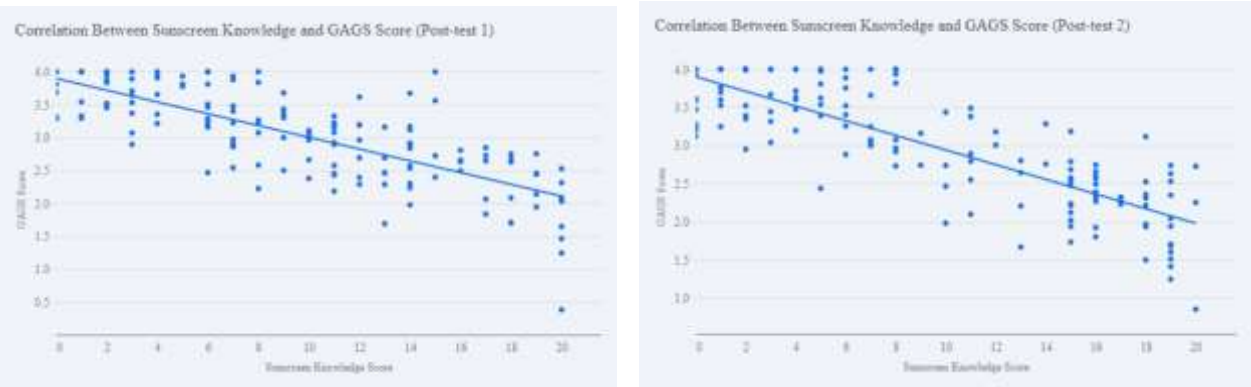


Figure 1. Correlation of sunscreen knowledge and GAGS score.

The results of this study indicate that the 8-week counseling intervention was effective in increasing adolescents' knowledge about sunscreen use. The significant increase in sunscreen knowledge scores in the intervention group after counseling, both in post-test 1 and post-test 2, shows that counseling is an effective method in conveying information about the correct use of sunscreen and its benefits in preventing and treating acne vulgaris. The increase in sunscreen knowledge in the intervention group can be attributed to several factors. First, the counseling intervention provides comprehensive and structured information about the use of sunscreen, including types of sunscreen, how to choose the right sunscreen, how to use sunscreen correctly, and the benefits of sunscreen in protecting the skin from the harmful effects of sunlight. This information is delivered interactively through discussions, questions and answers, and demonstrations, making it easier for adolescents to understand and remember the information. Second, counseling interventions provide opportunities for adolescents to ask questions and discuss with counselors about their skin problems, including acne vulgaris. This allows counselors to provide information that is more personalized and relevant to each adolescent's needs. Counselors can also provide emotional support and motivation to adolescents to use sunscreen regularly. Third, counseling interventions use various learning methods, such as discussions, demonstrations, role plays, and providing educational materials. This makes the learning process more interesting and enjoyable for adolescents. Apart from that, the use of various learning methods can also accommodate different learning styles in adolescents.[10-12]

The results of this study also show that counseling interventions are effective in reducing the incidence of acne vulgaris in adolescents. The significant reduction in GAGS scores in the intervention group after counseling, both at post-test 1 and post-test 2, indicates that counseling can help reduce the severity of acne vulgaris. The decrease in the incidence of acne vulgaris in the intervention group could be attributed to increased sunscreen knowledge and changes in skin care behavior. Adolescents who have better knowledge about sunscreen tend to be more motivated to use sunscreen regularly. Regular use of sunscreen can protect the skin from the harmful effects of sunlight, including inflammation and skin damage which can worsen acne vulgaris. Apart from that, the counseling intervention also provides education about other basic skin care for adolescents with acne vulgaris, such as the importance of cleaning the face regularly, avoiding squeezing or scratching acne, and using non-comedogenic skin care products. Applying proper skin care can help reduce sebum production, prevent pore blockage, and reduce inflammation, thereby reducing the incidence of acne vulgaris.[13-15]

The results of this study are in line with previous research which shows that education and counseling can increase adolescents' knowledge about acne vulgaris, change skin care behavior, and reduce the

severity of acne. A study showed that an 8-week counseling intervention could increase adolescents' knowledge about acne vulgaris and increase their adherence to treatment. Another study showed that educational interventions can reduce the severity of acne vulgaris in adolescents. However, this research has several advantages compared to previous research. First, this study used an experimental design with random sampling, which increases the internal validity of the study. Second, this study used validated instruments to measure sunscreen knowledge and acne vulgaris severity, thereby increasing the reliability and validity of the research results. Third, this research involves a comprehensive and structured counseling intervention, which covers various aspects related to sunscreen use and skin care.[16,17]

Several potential mechanisms may explain the effectiveness of counseling interventions in increasing sunscreen knowledge and reducing acne vulgaris. First, counseling can increase adolescents' motivation to use sunscreen regularly by providing accurate and relevant information about the benefits of sunscreen in protecting the skin from the harmful effects of sunlight, including in adolescents with acne vulgaris. Counseling can help adolescents understand that sunscreen is not only to prevent sunburn but also to protect the skin from long-term damage, such as premature aging and skin cancer. Second, counseling can help adolescents overcome barriers to using sunscreen. Many adolescents are reluctant to use sunscreen for various reasons, such as the texture of the sunscreen being sticky or oily, having difficulty finding a sunscreen that is suitable for acne-prone skin, or forgetting to use sunscreen when doing outdoor activities. Counseling can provide solutions to overcome these obstacles, such as recommending sunscreen that suits their skin type, providing tips on how to use sunscreen correctly, and reminding adolescents to use sunscreen regularly. Third, counseling can strengthen social support and increase adolescents' self-efficacy in caring for their skin. Social support from family, friends, and health workers can increase adolescents' motivation to use sunscreen and carry out other skin care. Self-efficacy is an individual's belief that they are capable of carrying out certain behaviors. Counseling can increase teens' self-efficacy in caring for their skin by providing the information, skills and support they need.[19,20]

This study has several limitations that need to be noted. First, this research was only conducted on the adolescent population in Jakarta, so generalizing the research results to other populations needs to be done with caution. The characteristics of adolescents in Jakarta, such as levels of sun exposure, skincare habits, and access to health information, may be different from adolescents in other areas. Therefore, further research needs to be conducted on more diverse adolescent populations to ensure the generalizability of research results. Second, this study only involved an 8-week counseling intervention. Although the results of the study indicate that the counseling intervention had significant short-term effects, the long-term effects of this intervention need to be further evaluated. Research with a longitudinal design can be conducted to monitor changes in sunscreen knowledge and the incidence of acne vulgaris in adolescents over a longer period of time. Third, this study did not measure other factors that could influence sunscreen use and the incidence of acne vulgaris, such as socioeconomic status, social support, and self-efficacy. These factors can act as moderators or mediators in the relationship between counseling interventions, sunscreen knowledge, and the incidence of acne vulgaris. Future research could include measurements of these factors to gain a more comprehensive understanding of the effectiveness of counseling interventions.

## 4. Conclusion

An 8-week counseling intervention was effective in increasing adolescents' knowledge about sunscreen use and reducing the incidence of acne vulgaris in the adolescent population in Jakarta. These findings support the importance of integrating counseling about sunscreen use into the clinical management of

acne vulgaris and adolescent health programs. Further research is needed to evaluate the long-term effects of counseling interventions and identify other factors that may influence sunscreen use and the incidence of acne vulgaris.

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