

## **EDUCATION ON NON-PHARMACOLOGICAL THERAPY AND THE USE OF NATURAL INGREDIENTS FOR THE PREVENTION OF CARDIOVASCULAR DISEASE AT SULTAN AGUNG 3 ISLAMIC HIGH SCHOOL IN SEMARANG**

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### **Abstrak**

Penyakit kardiovaskular merupakan penyebab utama kematian di seluruh dunia dan membutuhkan upaya pencegahan yang dimulai sejak masa remaja. Pendidikan kesehatan berbasis sekolah merupakan strategi penting untuk meningkatkan pemahaman tentang pencegahan penyakit kardiovaskular melalui pendekatan non-farmakologis dan penggunaan bahan-bahan alami. Studi ini bertujuan untuk mengevaluasi efektivitas pendidikan terhadap perubahan pengetahuan, sikap, dan perilaku siswa di SMA Islam Sultan Agung 3 Semarang. Desain yang digunakan adalah pretest-posttest satu kelompok dengan 40 siswa sebagai responden. Intervensi meliputi ceramah interaktif, video edukasi, diskusi, dan demonstrasi tentang penggunaan bahan-bahan herbal untuk kesehatan jantung. Analisis menggunakan uji *t* berpasangan. Hasil penelitian menunjukkan peningkatan yang signifikan dalam pengetahuan ( $4,40 \pm 1,35$  menjadi  $8,55 \pm 1,36$ ;  $p < 0,001$ ), sikap ( $25,35 \pm 4,07$  menjadi  $38,85 \pm 4,40$ ;  $p < 0,001$ ), dan perilaku ( $26,55 \pm 3,62$  menjadi  $38,30 \pm 4,76$ ;  $p < 0,001$ ). Pendidikan terbukti efektif dalam meningkatkan kesadaran dan kesiapan siswa untuk mengadopsi gaya hidup sehat dan memanfaatkan bahan-bahan alami sebagai tindakan pencegahan terhadap penyakit kardiovaskular. Program ini direkomendasikan untuk diimplementasikan secara berkelanjutan dalam kegiatan unit kesehatan sekolah.

### **Abstract**

Cardiovascular disease is the leading cause of death worldwide and requires prevention efforts starting in adolescence. School-based health education is an important strategy for increasing understanding of cardiovascular disease prevention through non-pharmacological approaches and the use of natural ingredients. This study aimed to evaluate the effectiveness of education on changes in knowledge, attitudes, and behaviors of students at Sultan Agung 3 Islamic High School in Semarang. The design used a one-group pretest-posttest with 40 students as respondents. The intervention included interactive lectures, educational videos, discussions, and demonstrations on the use of herbal ingredients for heart health. Analysis used a paired *t*-test. The results showed a significant increase in knowledge ( $4.40 \pm 1.35$  to  $8.55 \pm 1.36$ ;  $p < 0.001$ ), attitude ( $25.35 \pm 4.07$  to  $38.85 \pm 4.40$ ;  $p < 0.001$ ), and behavior ( $26.55 \pm 3.62$  to  $38.30 \pm 4.76$ ;  $p < 0.001$ ). Education was proven to be effective in increasing students' awareness and readiness to adopt a healthy lifestyle and utilize natural ingredients as a preventive measure against cardiovascular disease. This program is recommended to be implemented continuously in school health unit activities.

**Keywords:** Education, Non-pharmacological, Natural ingredients, Adolescents, Cardiovascular

## 1. INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death worldwide, accounting for over 18 million deaths annually (WHO, 2022). In Indonesia, the prevalence of heart and blood vessel disease is increasing due to lifestyle changes, lack of physical activity, high-fat food consumption, and high exposure to smoking among adolescents (Kemenkes Ri, 2022). Adolescence is a critical period for forming health habits, making educational interventions essential for instilling preventive behaviors from an early age (Widiastuti et al., 2022).

The prevention of cardiovascular disease can be achieved thru a combination of non-pharmacological therapies, such as physical activity, dietary regulation, stress management, and sufficient sleep (Ghodeswar et al., 2023). Additionally, the use of natural ingredients such as green tea, moringa leaves, turmeric, ginger, and garlic has been reported to potentially reduce the risk of cardiovascular disease due to their antioxidant content and lipid-lowering effects (Ferreira et al., 2021). Recent scientific findings also indicate that some local Indonesian plants have strong therapeutic potential. One of them is Lampeni (*Ardisia humilis*), a medicinal plant from Lampung that contains bioactive compounds such as flavonoids, phenolics, and terpenoids, according to GC-MS analysis. These compounds are known to have anti-inflammatory, antioxidant, and cardioprotective activities, potentially supporting the prevention of chronic diseases including PKV (Rini et al., 2025). This reinforces the urgency of utilizing Indonesia's natural materials as part of a promotional and preventive strategy in public health.

School-based health education has been proven effective in improving knowledge and behaviors related to chronic disease prevention in adolescents (Liu et al., 2020). However, educational programs on preventing PKV thru non-pharmacological approaches and natural materials are still rarely conducted in a structured manner in schools. In fact, Indonesia has incredible biodiversity and great potential as a source of health education based on local wisdom (Alfarizi, 2022).

Based on these conditions, this community service activity was carried out with the aim of providing comprehensive education to students at SMA Islam Sultan Agung 3 Semarang regarding PKV prevention strategies using a non-pharmacological approach and utilizing natural ingredients, as well as evaluating the effectiveness of the intervention thru changes in students' knowledge, attitudes, and behavior.

## 2. METHODS

### Research Design

The study used a one-group pretest-posttest design to measure changes in knowledge, attitudes, and behavior before and after education. The respondents were 40 students from Sultan Agung 3 Islamic High School in Semarang, aged 16–18 years. The subjects were selected thru total sampling from the students who were present and willing to participate in the entire series of activities.

### Educational Intervention

The intervention consisted of interactive lectures on cardiovascular disease, risk factors, the dangers of smoking, healthy eating, and physical activity; educational video screenings on CVD prevention; and education on natural ingredients (green tea, turmeric, and lampeni) as antioxidant and hypolipidemic agents.

The instrument consists of three structured questionnaires: knowledge (10 multiple-choice questions), attitude (10 Likert scale statements), and behavior (10 statements about health practices). Data collection procedures were carried out with a pretest administered 30 minutes before education and a posttest administered 1–3 days after education. The same instrument was used for pre- and post-tests.

### Data Analysis

The analysis was conducted using descriptive statistics (mean  $\pm$  SD) and a paired t-test to examine pre- and post-test differences. The significance level was set at  $p < 0.05$ .

**Petunjuk: Pilih satu jawaban yang paling benar (beri tanda X).**

1. Penyakit kardiovaskuler adalah gangguan yang menyerang...  
A. Paru-paru dan hati  
B. Otak dan saraf  
C. Jantung dan pembuluh darah  
D. Ginjal dan usus
2. Salah satu faktor risiko utama penyakit jantung pada remaja adalah...  
A. Pola makan tinggi lemak dan kurang olahraga  
B. Banyak minum air putih  
C. Tidur cukup  
D. Tidak makan gorengan
3. Aktivitas fisik minimal untuk menjaga kesehatan jantung adalah...  
A. 10 menit/hari  
B. 30 menit/hari  
C. 1 jam/minggu  
D. Tidak perlu olahraga
4. Zat dalam rokok yang paling merusak pembuluh darah adalah...  
A. Oksigen  
B. Nikotin  
C. Kafein  
D. Glukosa
5. Bahan alami yang dikenal dapat membantu menurunkan kolesterol adalah...  
A. Teh hijau  
B. Kopi  
C. Gula merah  
D. Santan
6. Tujuan utama terapi nonfarmakologi adalah...  
A. Mengganti obat dokter  
B. Membantu mencegah penyakit secara alami  
C. Menyembuhkan penyakit dengan cepat  
D. Menambah nafsu makan
7. Kelebihan garam dalam makanan dapat menyebabkan...  
A. Hipotensi  
B. Hipertensi  
C. Hipoglikemia  
D. Asma
8. Tidur cukup untuk remaja agar jantung tetap sehat adalah...  
A. 3-4 jam  
B. 5-6 jam  
C. 7-8 jam  
D. >10 jam
9. Daun kelor mengandung antioksidan yang berfungsi untuk...  
A. Menyimpan lemak  
B. Mencegah kerusakan sel  
C. Meningkatkan kadar gula  
D. Membuat tubuh gemuk
10. Upaya terbaik mencegah penyakit kardiovaskuler sejak remaja adalah...  
A. Menunggu jika sakit  
B. Konsumsi makanan sehat dan olahraga teratur  
C. Minum suplemen setiap hari  
D. Banyak tidur

**Figure 1.** Knowledge questions

**Petunjuk: Beri tanda (✓) pada kolom yang sesuai dengan pendapat Anda.**

**Skala: 1 = Sangat Tidak Setuju, 2 = Tidak Setuju, 3 = Ragu-ragu, 4 = Setuju, 5 = Sangat Setuju**

No	Pernyataan	1	2	3	4	5
1	Saya percaya penyakit jantung bisa dicegah sejak usia muda.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Gaya hidup sehat lebih penting daripada mengandalkan obat-obatan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Saya merasa olahraga rutin bisa menjaga kesehatan jantung.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Saya setuju bahwa konsumsi garam berlebihan berbahaya.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Saya percaya bahan herbal seperti teh hijau, kunyit, dan daun kelor bermanfaat untuk jantung.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Saya tertarik mencoba minuman herbal alami daripada minuman bersoda.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Menjaga pola makan seimbang adalah tanggung jawab saya sendiri.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Saya merasa merokok atau vaping tidak terlalu berpengaruh pada kesehatan jantung. (reverse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Saya percaya tidur cukup membantu mencegah tekanan darah tinggi.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Saya mendukung program sekolah yang mengajarkan gaya hidup sehat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure 2.** Question to find out attitudes

**Petunjuk: Tandai sesuai frekuensi yang paling menggambarkan diri Anda.**  
**Skala: 1 = Tidak Pernah, 2 = Jarang, 3 = Kadang-kadang, 4 = Sering, 5 = Selalu**

No	Pernyataan	1	2	3	4	5
1	Saya melakukan olahraga minimal 30 menit setiap hari.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Saya makan sayur dan buah setiap hari.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Saya membatasi konsumsi makanan berlemak atau gorengan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Saya menghindari minuman manis atau bersoda.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Saya tidur cukup (7–8 jam) setiap malam.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Saya tidak merokok atau menggunakan vape.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Saya mencoba mengelola stres dengan cara positif (dzikir, olahraga, atau hobi).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Saya rutin minum air putih minimal 8 gelas per hari.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Saya tertarik menggunakan bahan alami (misal: teh hijau, kunyit, daun kelor) untuk menjaga kesehatan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Saya mengingatkan teman atau keluarga untuk menjaga kesehatan jantung.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 3. Question to determine behavior

### 3. RESULTS AND DISCUSSION

#### Respondent Characteristics

A total of 40 students participated fully in the activity. Age range 16–18 years, with a relatively balanced composition of males and females.

#### Increased Knowledge, Attitudes and Behavior

The pretest–posttest scores show consistent improvement in all aspects.

Table 1. Pretest–Posttest Results (n = 40)

Variable	Pretest (Mean ± SD)	Posttest (Mean ± SD)
Knowledge	4.40 ± 1.35	8.55 ± 1.36
Attitudes	25.35 ± 4.07	38.85 ± 4.40
Behavior	26.55 ± 3.62	38.30 ± 4.76

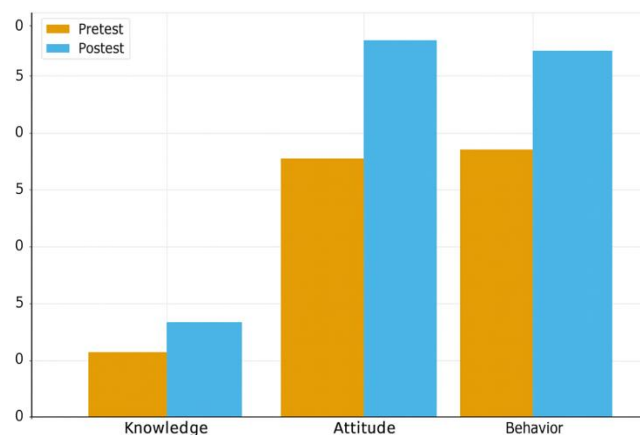


Figure 4. Changes in pretest and posttest scores

### Paired t-test results

Show a significant difference before and after education.

**Table 2.** Result of the Paired t-test

Variable	t-value	p-value	Interpretasi
Knowledge	-9.37	< 0.001	Signifikan
Attitudes	-9.28	< 0.001	Signifikan
Behavior	-7.93	< 0.001	Signifikan



**Figure 5.** Education for high school students



**Figure 6.** Educational media (leaflets)

The results showed a significant increase in students' knowledge scores from  $4.40 \pm 1.35$  to  $8.55 \pm 1.36$  after the intervention. This increase almost reached 94.3%, which indicates that the educational material was very easily accepted by participants (**Table 1**). This large increase is consistent with the knowledge acquisition mechanism in adolescents, where exposure to multimodal information (lectures, videos, discussions) can increase

information retention quickly (Liu et al., 2020). The active learning model has been proven to increase attention, involvement and understanding of health material.

If calculated using Cohen's  $d$  effect size, which is an effect size used to see how big the difference is between two groups in standard units (standardized mean difference), we get a value of  $d \approx 3.06$ , indicating a very large effect (Khisbiyah et al., 2024). These results illustrate that the intervention provided substantive change. This value is higher than meta-analyses of school education programs in various countries, which usually produce  $d$  between 0.6–1.2 for the knowledge domain (Durlak et al., 2011; Liu et al., 2020).

The significant effect (**Table 2**) could be caused by the material provided being very relevant to students' daily lives, the posttest was carried out within a short period of time (1-3 days), so the retention effect was still strong, and students were very interested in the topic of natural ingredients and the demonstration of making herbal drinks, resulting in emotional engagement which increased memory.

Analysis of the increase in attitude scores from 25.35 to 38.85 (53.2% increase) shows that education not only provides information, but also influences students' perspectives and internal motivation to take precautions. Some literature shows that good education can modify health beliefs, risk perceptions and benefit perceptions (Ghodeswar et al., 2023). In this context, students become more aware that unhealthy eating patterns, smoking and lack of physical activity are the main risk factors for PKV. This relationship is in line with the Health Belief Model theory which states that perceptions of risks and benefits are the main determinants of preventive behavior change (Alyafei & Easton-Carr, 2025).

The behavior score increased from 26.55 to 38.30 (44.3% increase). This increase is lower than knowledge and attitudes, but is still relatively high for short-term interventions (**Figure 4**). This finding is consistent with behavior change theory, that behavior change takes longer than knowledge. Changes in student behavior may be influenced by direct demonstrations of making herbal drinks which provide experiential learning, information about the risk of cardiovascular disease which gives rise to perceived severity, and a new understanding of natural ingredients (green tea, ginger and lampeni) as antioxidant and hypolipidemic agents (Rini et al., 2025).

This rapid change in behavior was also found in a school-based heart disease prevention study in Malaysia and China, which reported an initial increase in behavior of 25–40% in the first week (Guo et al., 2023). However, because the data was measured only 1-3 days after education, it is possible that this change is still a behavioral intention, not a long-term change in behavior. WHO (2022) states that sustainable behavior change requires repeated interventions, environmental support, and monitoring (WHO, 2022).

An important part of the intervention is education about natural ingredients that have been shown to have a protective effect on cardiovascular health. Apart from common herbal ingredients such as green tea, moringa, turmeric, ginger and garlic, recent research also highlights the potential of Lampeni (*Ardisia humilis*) originating from Lampung as a candidate for natural ingredient-based therapy.

#### 4. CONCLUSION AND RECOMMENDATIONS

In this Community Service, it can be concluded that school-based health education is very effective, this can be seen from the significant increase in the three domains, indicating that schools are strategic places for chronic disease prevention programs. A combination of lectures, audio-visuals and direct practice can strengthen the learning process. There needs to be continuous follow-up or monitoring for 1-3 months to see whether healthy behavior is still being carried out, and there needs to be a natural ingredients approach that attracts students' interest. This can be an effective educational strategy in Indonesia, considering that the culture of herbal consumption is quite high.

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