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The Effect of Clean and Healthy Lifestyle Education on Knowledge and Attitudes Regarding Type 2 Diabetes Mellitus Among High School Student

Najwa Annejang[1], Fanny Septiani farhan[2]
1, Medical Study Program, Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta
[2]Department of Biomedical Sciences, Faculty of Medicine and Health, Universitas Muhammadiyah Jakarta

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Abstract

Diabetes Mellitus (DM), a chronic metabolic disease characterized by elevated blood glucose levels caused by impaired insulin secretion, insulin resistance, or both. The prevalence of Type 2 Diabetes Mellitus among adolescents has been increasing, mainly due to unhealthy lifestyle patterns. The Clean and Healthy Lifestyle/Prilaku Hidup Bersih dan Sehat (PHBS) is a set of consciously practiced health behaviors aimed at improving and maintaining health, including consuming balanced nutritious foods, engaging in regular physical activity, maintaining personal hygiene, and avoiding smoking. PHBS education is considered essential in preventing Type 2 DM from an early age. This research aims to determine the effect of PHBS education on the prevention of Type 2 DM among adolescents at SMA Daar El-Qolam, Banten. The study is a pre-experimental design using a one-group pre-test and post-test approach. Data were collected using questionnaires assessing knowledge, attitudes, and behaviors related to diet, physical activity, and smoking, and were analyzed using the Wilcoxon test. The results showed a significant improvement in knowledge ($p<0.05$) as well as positive changes in attitudes and behaviors regarding healthy eating and physical activity after the intervention. The study concludes that PHBS education effectively enhances adolescents' knowledge, attitudes, and preventive behaviors toward Type 2 DM. School-based health education programs are recommended as promotive and preventive measures to reduce the risk of non-communicable diseases among high school student.

Corresponding Author:
Fanny Septiani Farhan
Universitas Muhammadiyah Jakarta, Indonesia
Email Coresspondent: fannyfarhan@umj.ac.id

1. INTRODUCTION

The rising incidence of non communicable diseases has emerged as significant global health challenge. Diabetes mellitus is one of chronic diseases that has gotten a lot of attention. The World Health Organization (WHO) declare that in 2019, about 382 million people around the world had diabetes mellitus (Nina et al., 2023). Diabetes mellitus is a chronic illness that occurs when the pancreas fail to make enough insulin or when the body can not use insulin properly.

People with this condition have blood sugar levels that are out of control, which can cause serious problems like damage to nerves and blood vessels (Murtiningsih et al., 2021).

Diabetes is the seventh leading cause of death in the world. The International Diabetes Federation (IDF) declare that about 10.2 million people in Indonesia (between the ages of 20 and 79) have diabetes. By 2045, this number is expected to rise to 16.7 million (Murtiningsih et al., 2021). There are about 56,560 cases of diabetes mellitus in Banten Province, which is a relatively high number. According to Riskesdas 2013 (Irawati & Firmansyah, 2020), Tangerang City had the highest rate of diabetes cases in the province in 2015, with 20,524 cases (1.7%). The number of diabetes cases in kids and teens keeps going up. Adolescents with diabetes often have unhealthy habits, like eating a lot of sugary and fatty foods, not exercising, and smoking. Along with lifestyle factors, genetic predisposition and environmental influences also raise the risk (Nina et al., 2023).

It is important to take early and proper steps to prevent problems. awareness of healthy lifestyle habits, regular exercise and balanced diet, can help prevent problems. Four things affect a person's health: environment, behavior, genes, and the healthcare services they use. Among these, behavior is the most important factor, especially when it comes to preventing diabetes (Arifatus Sholihah et al., 2023). Clean and Healthy Lifestyle Behavior (PHBS) is when people make a conscious effort to keep themselves from getting sick. PHBS helps teens build good habits like working out regularly, not smoking, eating less sugar, and choosing healthy foods (Laudasarni et al., 2024). The PHBS program is a government program that tries to improve public health by getting people to adopt healthy habits. There are ten indicators in total, but this study only looks at three that are important for preventing non-communicable diseases: a healthy diet, regular physical activity, and not smoking (Makruf dan Farhan, 2021). These factors are closely linked to the risk of diabetes. Eating a lot of sugar, salt, and fat can make you resistant to insulin and gain weight, both of which are major risk factors for Type 2 diabetes. Sedentary lifestyle makes insulin less effective, and smoking makes oxidative stress and inflammation worse in pancreatic β-cells, which makes problems with glucose metabolism worse. Compared to those who don't smoke, smokers are 30–40% more likely to get Type 2 diabetes (Nina et al., 2023). Teenagers are a key group to target for diabetes prevention because they are going through a time of change in their lives and are more likely to adopt unhealthy habits. Schools are also a great place for health education programs to take place (Irawati & Firmansyah, 2020). Health education centered on PHBS seeks to cultivate early healthy habits, promote accountability for individual and environmental health, and stimulate proactive engagement in disease prevention. Taking these things into account, this study looks at how PHBS education affects teenagers' attitudes and knowledge about diabetes mellitus.

2. METHOD

This is a pre-experimental research design using a one-group pre-test and post-test approach. The research was conducted at SMA Daar El-Qolam 2 Gintung Jayanti, Tangerang, Banten, in 2025. The study population included all students of SMA Daar El-Qolam 2. The sample consisted of students who met inclusion criteria, namely willingness to participate and complete all study procedures. Stratified random sampling was used.

The intervention consisted of PHBS education covering healthy diet, physical activity, and the dangers of smoking in relation to Type 2 Diabetes Mellitus prevention. Education was delivered through lectures and interactive discussions. Data were collected using structured questionnaires

measuring knowledge and attitudes before and after the intervention. Data analysis was performed using the Wilcoxon test with a significance level of $p < 0.05$.

3. RESULTS AND DISCUSSION

The results of the study showed an increase in respondents' knowledge scores after receiving PHBS education compared to before the intervention. Statistical analysis using the Wilcoxon test indicated a significant difference between pre-test and post-test scores ($p < 0.05$). In addition, there was a positive change in adolescents' attitudes toward the implementation of healthy dietary patterns and physical activity as efforts to prevent Type 2 Diabetes Mellitus.

Table 1 Distribution of Knowledge Levels (Pre-test and Post-test)

Knowledge	Pre-test (N)	Pre-test (%)	Post-test (N)	Post-test (%)	p-value
Good	**98**	**86.7%**	**112**	**99.1%**	**0.000**
Moderate	**12**	**10.6%**	**1**	**0.9%**	
Poor	**3**	**2.7%**	**1**	**0%**	
Total	**113**	**100%**	**113**	**100%**	

Based on Table 1, data on students' knowledge levels before PHBS education were obtained. Of the total 113 respondents, 98 respondents (86.7%) had a good level of knowledge, 12 respondents (10.6%) had a moderate level, and 3 respondents (2.7%) had a poor level. After PHBS education, an improvement in respondents' knowledge levels was observed. Of the 113 respondents, 112 respondents (99.1%) had a good level of knowledge, 1 respondent (0.9%) had a moderate level, and no respondents were categorized as having poor knowledge (0%).

The results of the Marginal Homogeneity test showed a p-value = 0.000 ($p < 0.05$), indicating a significant difference in the proportion of knowledge categories before and after PHBS education. Thus, it can be concluded that PHBS education has a significant effect on improving adolescents' knowledge regarding the prevention of Type 2 Diabetes Mellitus.

Table 2 Distribution of Attitude Levels (Pre-test and Post-test)

Attitude Level	Pre-test (N)	Pre-test (%)	Post-test (N)	Post-test (%)	p-value
Good	**53**	**47.0%**	**90**	**79.7%**	**0.000**
Moderate	**56**	**49.5%**	**22**	**19.4%**	
Poor	**4**	**3.5%**	**1**	**0.9%**	
Total	**113**	**100%**	**113**	**100%**	

Table 2 shows how students felt about things before they learned about PHBS. Out of the 113 people who answered, 53 (47.0%) had a good attitude, 56 (49.5%) had a moderate attitude, and 4 (3.5%) had a bad attitude. There was a change in the way people thought after they learned about PHBS. Of the 113 people who answered, 90 (79.7%) had a good attitude, 22 (19.4%) had a moderate attitude, and 1 (0.9%) had a bad attitude. The Marginal Homogeneity test yielded a p-value of 0.000 ($p < 0.05$), signifying a statistically significant difference in the distribution of attitude categories pre-

and post-PHBS education. Consequently, it can be inferred that PHBS education substantially influences the enhancement of adolescents' attitudes regarding the prevention of Type 2 Diabetes Mellitus.

Before the educational intervention, most people who answered the survey knew a little bit about Clean and Healthy Lifestyle Behavior (PHBS) and Type 2 Diabetes Mellitus. Following the intervention, there was a notable enhancement in the "good" category, signifying that the educational initiative successfully augmented adolescents' comprehension of PHBS concepts and their correlation to the prevention of non-communicable diseases, including diabetes (Herdiana et al., 2019; Green & Kreuter, 2005). These results align with the research conducted by Herdiana et al. (2019), which indicates that enhancements in health knowledge can be attained through organized and repetitive educational interventions. The Health Promotion Model put forth by Green also stresses that knowledge is a major factor that makes people more likely to change their health behavior (Green & Kreuter, 2005).

The enhancement in knowledge was also affected by the pedagogical techniques employed, specifically interactive delivery, the utilization of straightforward language, and the incorporation of pertinent real-life examples for adolescents. This method helps teens understand health information and connect it to their daily lives (Notoatmodjo, 2014). The study results indicated a rise in positive attitudes among adolescents following PHBS education. Most of the people who answered the survey were more in favor of encouraging people to live clean and healthy lives by eating well, exercising regularly, and not smoking. This indicates the internalization of health values subsequent to adequate comprehension (Wulandari & Astuti, 2020). These results are consistent with Lawrence Green's theory, which posits that attitudes are developed through cognitive processes following the acquisition of information. Positive attitudes develop when individuals possess a comprehensive understanding and awareness of the advantages of healthy behaviors (Green & Kreuter, 2005). The educational intervention also encouraged students to change how they thought about healthy lifestyles. Teens who used to think that eating well and being active were hard to do started to be more open to doing these things. This substantiates that enhanced knowledge can affect attitudes and health behaviors (Notoatmodjo, 2014). WHO (2020) says that changes in the behavior of teenagers can be seen in the results of surveys that show they are more likely to live clean and healthy lives after learning about them. For example, they are more likely to eat better, exercise regularly, and not smoke. PHBS education directly influences adolescents' awareness of health maintenance.

These findings support Notoatmodjo's theory (2014), which explains that health behavior is formed through three main components: knowledge, attitude, and practice. Once adequate knowledge is acquired, attitudes and behaviors tend to follow in a positive direction. These behavioral changes are important as preventive measures against Type 2 Diabetes Mellitus. Establishing clean and healthy lifestyle habits during adolescence can significantly reduce the risk of developing non-communicable diseases in adulthood (Murtiningsih et al., 2021).

The consistency between the study findings, theoretical frameworks, and previous research indicates that health education, particularly PHBS, is effective in improving knowledge and positive attitudes among adolescents. For instance, Laudasarni et al. (2024) found that school-based PHBS education significantly improves students' healthy behaviors.

In addition, Murtiningsih et al. (2021) reported that unhealthy lifestyles during adolescence are a major risk factor for developing Type 2 Diabetes Mellitus in adulthood. Therefore, implementing PHBS in the school environment is crucial for establishing healthy lifestyle behaviors from an early age. Theoretically, these findings are also aligned with the Health Belief Model, which suggests that individuals are more likely to engage in healthy behaviors when they perceive the benefits positively and feel susceptible to disease if they do not adopt such behaviors (Rosenstock et al., 1988).

4. CONCLUSION

Clean and Healthy Lifestyle (PHBS) education has a significant effect on improving adolescents' knowledge and attitudes toward the prevention of Type 2 Diabetes Mellitus. School-based health education is recommended as a promotive and preventive strategy to reduce the risk of non-communicable diseases among adolescents.

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