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Influence of Health Workers and Teachers of SMA 10 RL on the Socialization of Marigold Plants, Cathatarantus Roseus, Ovitrap Fermentation to Minimize Flies, Mosquitoes, and Preventive of DHF

Rustam Aji Rochmat[1]*, Dewi Lusiani[2], & Reza Fahlevi[3]
[1]*Politeknik Kesehatan Kemenkes Bengkulu, Indonesia, [2]Politeknik Kesehatan Kemenkes Jakarta III, Indonesia, [3]Universitas Tarumanagara, Indonesia
*Co e-mail: adjieroestamadjie@gmail.com[1]

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ABSTRACT

Dengue hemorrhagic fever (DHF) remains a significant public health problem in tropical regions, including Indonesia, due to the rapid spread of Aedes aegypti and Aedes albopictus mosquitoes. Effective prevention strategies require community involvement and awareness. This study examined the influence of health workers and teachers at SMA 10 RL in socializing the use of Tagetes erecta (marigold), Catharanthus roseus, and fermented ovitrap to minimize mosquito larvae and prevent DHF. The research design used a pre-experiment with a one-group pretest-posttest method, involving 90 students selected by purposive sampling. The intervention included educational sessions and demonstration of mosquito control practices. Data were collected through questionnaires and analyzed using the Paired Sample T-Test test. The results showed a significant increase in students' knowledge scores from 57.18 (pretest) to 82.84 (posttest), as well as practice scores from 55.64 to 79.74 ($p < 0.05$). These findings suggest that the integration of biological-based mosquito control methods in educational programs can increase the effectiveness of dengue prevention. Collaboration between health workers and teachers plays an important role in ensuring effective knowledge dissemination and application. Future research should explore long-term behavioral changes and the potential for implementing similar programs in different educational institutions.

Keywords: *Dengue Prevention, Mosquito Control, Health Educatio, Tagetes Erecta, Catharanthus Roseus, Ovitrap Fermentation*

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INTRODUCTION

Dengue Hemorrhagic Fever (DHF) remains a major public health concern in tropical and subtropical regions, especially in countries like Indonesia where the Aedes aegypti mosquito thrives in urban environments (WHO, 2021). The spread of DHF can be significantly reduced through early prevention strategies involving community engagement, environmental control, and educational interventions.

One effective approach to controlling the mosquito population is the implementation of eco-friendly and community-based methods such as the use of natural repellents like Tagetes erecta (marigold), Catharanthus roseus (tapak dara), and ovitraps with fermented bait, which have shown potential in reducing the breeding of disease vectors (Mulyaningsih et al., 2020; Fitriani & Rachman, 2018). These methods are not only low-cost and sustainable but also increase public awareness and participation in vector control efforts.

Health workers and educators play a vital role in disseminating knowledge and fostering behavioral change within communities. Involving teachers and health professionals in educational institutions can enhance students' understanding and encourage the adoption of preventive health practices at an early age (Notoatmodjo, 2012). Therefore, this study aims to examine the influence of health workers and teachers at SMA 10 RL on the socialization and implementation of marigold plants, Catharanthus roseus, and ovitrap fermentation as strategies to minimize flies and mosquitoes, thereby contributing to the prevention of DHF.

Dengue hemorrhagic fever (DHF) is a disease caused by a virus transmitted through the bite of mosquitoes of the Aedes genus, specifically Aedes albopictus and Aedes aegypti. The spread of the disease generally occurs through the bites of the two mosquito species, which have different habitat preferences; Aedes aegypti is more often found near residential areas and tends to bite humans, while Aedes albopictus is usually found in park areas and prefers to suck the blood of animals. DHF is often associated with interactions between humans and the environment, which are not always favorable, as seen in the case of the spread of this disease (Fatmawati & Windarto, 2018). The disease begins with symptoms similar to influenza, including high fever, headache, pain behind the eyes, joint pain, and skin rash. If not treated properly, DHF can develop into a more serious and potentially fatal condition due to complications such as bleeding or shock. According to data from the Indonesian Ministry of Health, the number of dengue cases shows annual fluctuations, with an increase in cases often occurring during the rainy season, when the population of Aedes aegypti mosquitoes increases significantly.

Indonesia, with its tropical climate, provides a very conducive environment for the development of mosquitoes, so Dengue Fever (DHF) is a frequent occurrence, especially during the rainy season, and can become dangerous if not treated promptly. Some infected individuals may be asymptomatic, while others only experience mild symptoms such as fever. However, there are also more serious cases, where severe symptoms can be life-threatening. The disease generally goes through three phases, starting from the initial symptoms to the recovery stage. In mild cases, symptoms may include high fever, rash, and muscle and joint pain. In contrast, in more severe

cases, known as Dengue Hemorrhagic Fever, there can be severe bleeding, a drastic drop in blood pressure, and even a risk of death (Ariyani et al., 2023).

Several factors play a significant role in the occurrence of Dengue Fever (DHF) cases including environmental conditions, age, level of knowledge, and community attitudes. Environmental factors that contribute to DHF cases consist of several aspects, namely: physical environmental conditions, which include the frequency of cleaning containers, the availability of container lids, and occupancy density; biological environmental conditions, which include the density of mosquito vectors and the presence of larvae in containers; and social environmental conditions, which include population density, support from health workers, experience of attending health counseling, as well as factors such as occupation, education, history of DHF disease, and habit of hanging clothes (Saputra et al., 2023).

Vector control is a very important aspect of dengue prevention efforts. There are several techniques that can be applied to control mosquito populations, including: 1) chemical methods; 2) biological methods; and 3) environmental methods. The government has implemented various initiatives, such as fogging, eradication, and Mosquito Nest Eradication (PSN). Mosquitoes often build nests indoors, including in closets and other indoor areas, and tend to hide in cool, shady places outside. Water-containing places in or around homes, schools and other locations provide a place for female mosquitoes to lay their eggs. Within ten days, the eggs will hatch into adult mosquitoes (Rubandiyah & Nugroho, 2018). One method of vector control that has been studied is the use of plants, such as marigold (Tagetes erecta) and tapak dara (Catharanthus roseus). Tapak dara flower extract is known to have potential as an effective natural insecticide against Aedes aegypti mosquitoes (Aji, 2020). In addition, the use of a modified ovitrap method can be applied to capture mosquito larvae by utilizing used bottles and gauze (Kurniawati et al., 2020).

Adolescent age is a group that is very sensitive to change and renewal, given that individuals in this group are at a significant stage of growth and development. At this age, children are sensitive to various stimuli, so they are easy to guide, direct, and instill good habits, including healthy living habits. This is important, especially considering that mosquitoes can breed in the home and school environment (Notoadmodjo, 2012).

Knowledge about dengue fever can be improved through an effective socialization program. The concept of socialization involves the delivery of material about DHF disease, its infectious vectors, as well as information about the implementation of the Mosquito Nest Eradication (PSN) with the 3M plus approach (Sugiyono & Darnoto, 2017). DHF cases often occur in the school environment, especially through School Health Unit (UKS) activities; however, not all schools have activated the UKS activities. Based on an interview with the school principal, the community service program has been implemented regularly every month. However, there are still challenges, such as students' habit of littering, especially drink bottles and cups, and lack of attention to the cleanliness of students' desk drawers, which have not been thought of (Kasenda et al., 2020).

The role of health workers and teachers is crucial in disseminating information and educating the public about dengue fever prevention. Health workers contribute to educational

campaigns through various media, seminars, and community activities, with the aim of conveying information about the causes, symptoms, and prevention measures of DHF (Suparman, 2008). On the other hand, teachers have a strategic role in teaching students about the importance of maintaining environmental hygiene and implementing dengue prevention measures from an early age. Collaboration between health workers and teachers can strengthen socialization and education efforts, so that information about dengue prevention can be spread more widely and effectively, and increase public awareness of the importance of maintaining a healthy environment.

Despite various efforts, there is still a gap between knowledge and practice of DHF prevention in the community. Several studies have shown that the active role of health workers and community leaders has a positive impact on DHF prevention measures, such as Mosquito Nest Eradication (PSN) and 3M Plus. However, the involvement of teachers in socializing the use of marigolds, tapak dara, and fermented ovitraps as methods of preventing DHF has not been widely studied. In addition, the effectiveness of collaboration between health workers and teachers in increasing community awareness and preventive actions against DHF has not been explored in depth.

Based on this analysis, this study aims to assess the effect of collaboration between health workers and teachers of SMA 10 RL in socializing the use of marigold plants, tapak dara, and fermented ovitraps as an effort to minimize mosquito larvae and prevent DHF. This study is expected to provide new contributions in dengue prevention strategies through a collaborative approach between health workers and educators, as well as enrich the literature regarding the implementation of natural methods in dengue vector control at the community level.

METHODS

This study used a quantitative method with a pre-experimental design of one-group pretest-posttest design to measure the effect of socialization conducted by health workers and teachers on increasing knowledge, attitudes, and practices of SMA 10 RL students in DHF prevention efforts through the use of marigold plants (Tagetes erecta), tapak dara (Catharanthus roseus), and fermented ovitraps. The sample of this study was 60 students of SMA 10 RL who were selected by purposive sampling with the criteria of being willing to participate in the entire series of socialization activities and filling out questionnaires. Data were collected through questionnaires to measure students' knowledge, attitudes, and practices before and after the socialization, and participatory observation to record students' direct practices related to dengue prevention. Data analysis was conducted using the Paired Sample T-Test test to see differences in the level of knowledge, attitudes, and practices of students before and after socialization. This study used a quantitative approach in accordance with the research guidelines described by Creswell (2014), which emphasizes numerical data collection and statistical analysis to evaluate the effect of interventions on certain variables (Creswell, 2014).

RESULTS

1. Respondent Characteristics

The analysis was carried out in accordance with the data obtained from respondents including the age and class of respondents. An overview of the analysis of respondent characteristics is illustrated in table 1 below as follows :

Table 1. Respondent Characteristics

Respondent Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	40	44,4
Female	50	55,6
Education		
X	35	38,9
XI	25	33,3
XII	20	27,8

Based on the Characteristics of Respondents presented, it can be seen that out of a total of 90 students who participated as respondents, the majority consisted of women, as many as 50 people (55.6%), while men amounted to 40 people (44.4%). This finding shows that the involvement of female students in this study is higher than that of male students. In terms of class distribution, the most respondents came from class X, with 35 people (38.9%), followed by class XI with 30 people (33.3%), and class XII with the least, 25 people (27.8%). This distribution indicates that the study involved more class X students, which is likely due to the fact that they have more time and involvement in socialization activities, compared to class XII students who are focused on preparing for final exams.

Table 2. Distribution of Students' Knowledge Before and After Socialization

Variable	n	Average knowledge Score	Standard Deviation	*p value*
Pretest	90	57,18	6,30	0,00
Postest	90	82,84	5,81	

Based on the results of the study that showed the average score of students' knowledge before (pretest) and after (posttest) socialization about marigold plants, *Catharanthus roseus*, and the use of ovitrap fermentation in efforts to minimize larvae and prevent dengue fever, it can be concluded that the socialization was very effective. The average score of students' knowledge before the socialization was recorded at 57.18 with a standard deviation of 6.30, while after the socialization, the average score increased to 82.84 with a standard deviation of 5.81. This significant increase indicates that students gained a better understanding after attending the socialization. The significance test showed a p-value of 0.00 ($p < 0.05$), which confirms that the difference between the mean pretest and posttest scores is statistically significant. This finding indicates that the socialization conducted by health workers and teachers at SMA 10 RL successfully improved students' knowledge on dengue vector control plants and mosquito larvae prevention methods.

Table 3. Distribution of Students' DHF Handling Practices Before and After Socialization

Variable	n	Average practice score	Standard Deviation	*p value*
Pretest	90	55,64	6,19	0,00
Postest	90	79,74	6,99	

Based on the results of the study that showed the average score of students' practice before (pretest) and after (posttest) socialization on marigold plants, Catharanthus roseus, and ovitrap fermentation in an effort to minimize larvae and prevent dengue hemorrhagic fever (DHF), it can be concluded that the socialization was very effective. The average score of students' knowledge before the socialization was 55.64 with a standard deviation of 6.19, while after the socialization, the average score increased to 79.74 with a standard deviation of 6.99. The significant increase shows that students gained a better understanding after attending the socialization. The significance test showed a p-value = 0.00 ($p < 0.05$), which confirms that the difference between the average pretest and posttest scores is statistically significant.

DISCUSSION

The results showed that socialization conducted by health workers and teachers at SMA 10 RL significantly improved students' understanding of dengue prevention. This was evident from the increase in the average score of students' knowledge from 57.18 (pretest) to 82.84 (posttest) and the increase in practice score from 55.64 to 79.74 with a p value <0.05. These results are in line with previous research which shows that health education plays a major role in changing individual behavior in adopting healthy living practices (Sugiyono & Darnoto, 2017). The age factor of adolescents who are still in the growth and development stage also supports the effectiveness of this socialization, because they are more responsive to new information and tend to apply it in their daily lives.

This study proved that socialization conducted by health workers and teachers significantly improved students' knowledge and practices in dengue prevention. The pretest and posttest analysis results showed a significant increase in students' understanding of natural methods of DHF prevention, including the use of marigold (Tagetes erecta), tapak dara (Catharanthus roseus), and ovitrap fermentation. This improvement is in line with research conducted by Basir et al. (2024), who found that training jumantik cadres with ovitraps could improve students' understanding of dengue prevention. However, the study also noted that increased knowledge is not always significant if it is not accompanied by direct practice and ongoing mentoring.

School children are a group that is highly vulnerable to Dengue Fever (DHF) infection. According to Dr. H. Mohammad Subuh, MPPM, from the Directorate General of Disease Control and Environmental Health of the Ministry of Health of the Republic of Indonesia, children who are at school between 8 to 10 am have the highest risk of being infected with DHF. Therefore, it is very important to instill an understanding of Mosquito Nest Eradication (PSN) from an early age, in order to form a strong behavior and mindset for the future. In addition, school children are more

easily involved in PSN activities compared to adults, so they need to be trained to become little Jumantik or flick monitors (Widyastututik, 2020).

Understanding the National Mosquito Net (PSN) program for school students is crucial for instilling mosquito nest eradication behaviors from an early age, which will shape their thinking and actions in the future. Students in schools can contribute significantly to dengue fever control efforts in Indonesia, both by acting as mosquito larvae monitors (Jumantik) and implementing mosquito nest eradication (PSN) activities in the school environment and at home (Widyastutik et al., 2020).

Collaboration between health workers and teachers is very important in improving the effectiveness of socialization. Teachers have a role in building healthy habits in students, while health workers provide scientific validation related to dengue prevention methods. This is supported by a study conducted by Rustam Aji et al. (2024), which showed that education on the tapak dara plant significantly improved students' understanding of the larvicidal effect of this plant against mosquitoes. However, a challenge in implementing this approach is the need for further training for teachers so that they can deliver evidence-based information more effectively. In addition, active participation of health workers in school activities should be strengthened to optimize long-term impact.

Marigold and tapak dara plants have potential as natural mosquito repellent agents because they contain bioactive compounds that are insecticidal. The study by Rochmat et al. (2024) found that marigold flower extract contains lutein and flavonoids that can disrupt the mosquito life cycle, while tapak dara contains alkaloids that play a role in inhibiting the development of mosquito larvae. The utilization of these plants as mosquito vector control methods provides a more environmentally friendly alternative to the use of chemical insecticides. However, further studies are needed to determine the optimal dosage as well as the most effective application method.

Fermented ovitraps are an innovative mosquito control method that works by attracting female mosquitoes to lay eggs in modified containers. Research by Nuriyah & Justitia (2021) found that ovitraps installed indoors showed a higher capture rate of Aedes aegypti mosquitoes than conventional methods. However, the effectiveness of ovitraps depends heavily on community participation in their construction and maintenance. Therefore, education on how to construct and use ovitraps must be continuously strengthened for wider and more effective implementation.

The results of this study provide important insights for the development of dengue prevention policies, especially in the context of education and public health. Some recommendations that can be adopted based on these findings include the integration of DHF prevention education in the school curriculum to increase student awareness, the formation of student health cadres as agents of change in the school environment, empowerment of teachers as health education facilitators with additional training on natural methods of mosquito control, and school collaboration with the health office for periodic monitoring and evaluation of the effectiveness of the methods applied. By implementing these measures, it is expected that the DHF

prevention program can run more effectively and sustainably, and have a direct impact on reducing the incidence of DHF in the community.

CONCLUSIONS

The results of this study showed that socialization conducted by health workers and teachers of SMA 10 RL significantly improved students' understanding and practice in dengue hemorrhagic fever (DHF) prevention. This was evidenced by an increase in students' knowledge score from 57.18 before socialization to 82.84 after socialization, as well as an increase in practice score from 55.64 to 79.74, with a p value <0.05 indicating statistical significance. The socialization method that prioritized the use of marigold (Tagetes erecta), tapak dara (Catharanthus roseus), and ovitrap fermentation proved effective in increasing students' awareness of efforts to control mosquito vectors that cause dengue. Collaboration between health workers and teachers plays an important role in ensuring the success of socialization, with teachers as educational facilitators and health workers as providers of evidence-based information. Although the results of this study show the success of the intervention, further steps are needed to ensure the sustainability of the socialization program. Recommendations include integrating dengue prevention education into the school curriculum, establishing student health cadres, and increasing cooperation between schools and health offices in monitoring and evaluation programs. With these sustainable efforts, it is expected that the incidence of DHF can be effectively reduced in the school and community environment.

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