



Promoting asthma prevention and control through vitamin D supplementation at Zainul Hasan Genggong Islamic Boarding School

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ABSTRACT

Vitamin D (VitD) has been studied for its role in the immune system, particularly in regulating the body's inflammatory response. Vitamin D deficiency can increase the risk of respiratory tract infections, which can trigger asthma exacerbations. In asthma patients, VitD can act as an immunomodulator in respiratory epithelial cells. The objective of this community service program is to increase students' knowledge about the benefits of vitamin D supplementation in the recognition and management of asthma among students at the Zainul Hasan Genggong Islamic boarding school in Probolinggo. This community service project used an observational analytical method to process questionnaire data. The participants were 40 male and female students at Zainul Hasan Genggong Islamic boarding school. This activity was conducted using a lecture, discussion, and question-and-answer approach. The results of the Wilcoxon signed-rank test showed an increase in the students' knowledge, with a pre-test average score of 30 and a post-test average score of 65, indicating a significant increase (p -value < 0.001). The conclusion drawn is that students can understand asthma and the role of vitamin D supplementation in asthma management after receiving counseling, and it is hoped this education will encourage students to adopt healthy lifestyles, recognize asthma symptoms early, and take appropriate action.

Keywords: Vitamin D; Asthma; Prevention; Islamic boarding schools

INTRODUCTION

Over 260 million people worldwide suffer from asthma, which is still one of the most prevalent chronic respiratory conditions and a major contributor to annual rates of morbidity and mortality (GINA, 2024). Due to low understanding and early exposure to environmental causes, asthma is becoming more common in Indonesia, especially among children and adolescents who are vulnerable groups (Kemenkes RI, 2018). According to a number of research, environmental variables, inadequate health education, and dietary deficiencies, especially vitamin D insufficiency, are frequently linked to poor asthma control (Hall & Agrawal, 2017; Salmanpour et al., 2022).

Vitamin D plays a crucial role not only in bone metabolism and calcium homeostasis but also in regulating immune responses and inflammation in the respiratory tract. Vitamin D deficiency has been linked to increased airway inflammation, hyperresponsiveness, and a higher frequency of asthma exacerbations, according to numerous research (El-Gamal et al., 2018). Additionally, vitamin D supplements have been demonstrated to improve overall respiratory health outcomes, lessen the severity of asthma, and increase lung function (Martineau et al., 2019).

An analysis of the community at Zainul Hasan Genggong Islamic Boarding School in Probolinggo revealed that many students (santri) had limited understanding of asthma and its

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underlying causes. The students' daily routines primarily took place indoors, leading to minimal sun exposure which is an essential natural source of vitamin D. Combined with limited access to balanced nutrition and preventive health education, this environment increases the likelihood of vitamin D deficiency and suboptimal asthma management among students. Vitamin D deficiency can worsen asthma symptoms, especially in students with a history of asthma. The subjects of the study were male and female students at the Zainul Hasan Genggong Islamic Boarding School. Initial interviews revealed that some students had respiratory symptoms such as recurrent coughing, shortness of breath, and a history of asthma. However, most were unaware of the link between asthma management and vitamin D deficiency, indicating the need for educational intervention and vitamin D supplementation to improve understanding and enable early prevention.

To address these conditions, a community engagement program was implemented to introduce and promote asthma prevention and management through vitamin D education. The activity included interactive counseling, distribution of educational materials, knowledge test, and vitamin D supplementation for selected students.

LITERATURE OR CONCEPTUAL REVIEW

Asthma is a heterogeneous disease characterized by chronic inflammation of the airways with symptoms such as wheezing, shortness of breath, chest tightness, and coughing that vary over time and in intensity (GINA, 2024). Asthma is one of the global health problems, with a prevalence of around 262 million cases in 2019, and contributes to more than 450,000 deaths each year (WHO, 2024). The 2018 Riskesdas results show that the prevalence of asthma in Indonesia is 2.4% in all age groups, with a higher burden of disease in children and adolescents in densely populated areas (Kemenkes RI, 2019).

Islamic boarding schools are one of the oldest educational institutions in Indonesia. They are known by the community as traditional educational, missionary, and social institutions for practicing Islamic teachings (Achlamy, 2024). Students at Islamic boarding schools have busy daily schedules, live in dormitories, and are sometimes exposed to asthma risk factors such as high humidity, dust, or poor ventilation (Labitta et al., 2016).

Selain faktor lingkungan, defisiensi vitamin D juga berperan dalam peningkatan prevalensi penyakit pernapasan seperti asma (Hall & Agrawal, 2017). Sumber vitamin D dapat diperoleh dari sinar UVB yang disintesis di kulit, atau dikonsumsi melalui suplemen makanan dan sumber makanan yang berasal dari hewan, tumbuhan serta makanan yang difortifikasi. Makanan yang mengandung vitamin D diantaranya yaitu susu, yogurt, keju, hati sapi, telur, coklat, jus jeruk, serta biji-bijian (Benedik, 2022). In addition to environmental factors, vitamin D deficiency also plays a role in increasing the prevalence of respiratory diseases such as asthma (Hall & Agrawal, 2017). Vitamin D can be obtained from UVB rays synthesized in the skin, or consumed through dietary supplements and food sources derived from animals, plants, and fortified foods. Foods that contain vitamin D include milk, yogurt, cheese, beef liver, eggs, chocolate, orange juice, and grains (Benedik, 2022).

A systematic review study reported that vitamin D deficiency in healthy children in Asia is a common condition (Oktaria et al., 2022). In addition to insufficient intake of foods containing vitamin D, vitamin D deficiency can be linked to suboptimal skin exposure to sunlight due to modern lifestyles, including working and spending more time indoors, and wearing clothing that covers almost the entire body (except the face and hands) due to religious beliefs (Saptarini, 2019). Islamic boarding schools have rules regarding clothing, such as prohibiting the wearing of jeans, pencil skirts, and Hawaiian shirts. Female students are required to wear modest, non-tight, and non-transparent clothing in accordance with applicable regulations (Jamiah et al., 2023). Recent studies have reported a link between vitamin D deficiency and an increased risk of asthma and asthma exacerbations (Ali & Nanji, 2017; Salmanpour, et al., 2022). Various studies indicate that vitamin D plays an immunomodulatory role, helping to reduce airway inflammation and improve the body's response to

asthma therapy (Martineau et al., 2017; Jolliffe et al., 2022). Vitamin D supplementation has been shown to reduce the frequency of asthma attacks and improve symptom control, especially in populations with low vitamin D levels (Jolliffe et al., 2022).

MATERIALS AND METHODS

This activity was held in May 2025 at the Zainul Hasan Genggong Islamic Boarding School in Probolinggo. This community service activity was carried out by 40 male and female students of the Zainul Hasan Genggong Islamic Boarding School in Probolinggo. The Zainul Hasan Genggong Islamic Boarding School in Probolinggo was chosen because it accommodates thousands of students in crowded dormitories and operates under the guidance of the Faculty of Medicine at Nahdlatul Ulama University in Surabaya. The average age of the boarding school students ranges from 12 to 15 years old for junior high school and from 15 to 18 years old for high school.

We carried out the community service by providing counseling to the students through lectures, question and answer sessions, and discussions. The activity consisted of three stages: preparation, implementation, and completion. The preparation stage consisted of obtaining permits, surveying the location, and analyzing the problem. The implementation stage consisted of counseling on the role of vitamin D supplementation in the recognition and management of asthma. The final stage consists of evaluation and suggestions, followed by the awarding of prizes to the most active participants and the symbolic distribution of vitamin D, especially to students with a history of asthma, so that it can be used as a supplement in the management and prevention of asthma. The indicators of success consist of the attendance of ≥ 40 participants, the activity, and the enthusiasm of the participants.

RESULTS AND DISCUSSION

The outreach event was successfully held and involved 40 male and female students at the Zainul Hasan Genggong Islamic Boarding School in Probolinggo. The participants then filled out the attendance sheet and took their seats according to their gender. The educational event began with remarks from representatives of the boarding school, the organizers, and the chair of the event. All students arrived on time and followed the program from start to finish, demonstrating their interest and enthusiasm for the agenda. The students were also active during the educational session, actively asking the speakers questions about the material presented. At the end of the event, awards were given to the most active participants, and vitamin D was distributed symbolically, especially to students with a history of asthma. The entire series of activities ran smoothly without significant obstacles, indicating the success of the program in involving the target community.



Figure 1. Educational material about asthma



Figure 2. Group photo of participants at the end of the session

Before and after the counseling session, participants were given a questionnaire on their knowledge of the role of vitamin D in asthma management. The results of the counseling session are as follows:

Table 1. Results of the Wilcoxon rank test on students' knowledge of the role of vitamin D in asthma management

Test	Mean	Std. Deviasi	Min	Max	P-value
Pre-Test	30.2	13.4	10	60	<0,001
Post-Test	65,2	17.2	30	100	

The average pre-test score was 30.2, while the average post-test score was 65.2. There was an increase of 35.0 from before the material was given (pre-test) to after the material was given (post-test). Based on the results of the statistical analysis above, there was a significant increase in the post-test score compared to the pre-test. This indicates an increase in students' understanding of the role of vitamin D in asthma management.

DISCUSSION

Scientifically, vitamin D supplementation has important relevance in the prevention and management of asthma. Vitamin D plays a multifunctional role in the pathogenesis and management of asthma, affecting the immune response and potentially alleviating symptoms associated with this chronic respiratory condition. The correlation between vitamin D deficiency and asthma exacerbation has been reported in several studies, suggesting that vitamin D deficiency can worsen airway inflammation and increase the frequency of acute asthma attacks. A significant relationship was observed between low serum vitamin D levels and asthma severity and control in children, as children with poorly controlled asthma were found to have significantly lower 25-hydroxyvitamin D levels compared to children with well-controlled asthma (El-Gamal et al., 2018; Hall & Agrawal, 2017; Salmanpour et al., 2022).

A meta-analysis study reported that the prevalence of vitamin deficiency in Indonesia is 33% in children aged 6 months to 19 years (Octavius, et al., 2023). This condition needs serious attention, especially since vitamin D deficiency can worsen susceptibility to respiratory diseases. These findings support the importance of education-based interventions and vitamin D supplementation for young people, such as Islamic boarding school students, who are at high risk of vitamin D deficiency due to

limited exposure to sunlight and insufficient consumption of foods or supplements rich in vitamin D. With activity results showing active participation from students and the provision of vitamin D supplements, this educational program can serve as a good first step in introducing the concept of nutrition-based asthma management and health education within the boarding school environment.

CONCLUSIONS

The community service activities at the Zainul Hasan Genggong Islamic Boarding School in Probolinggo went well and were enthusiastically attended by male and female students. The students gained a better understanding of asthma and the role of Vitamin D supplementation, particularly in the prevention and management of asthma, as evidenced by a significant improvement in post-test results. The knowledge gained is expected to encourage students to adopt healthy lifestyles, recognize the early symptoms of asthma, and take appropriate measures to manage the condition.

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Conflict of Interests

The authors declared that no potential conflicts of interest with respect to the authorship and publication of this article.

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