Sinesia : Journal of Community Service
Vol. 2, No. 1, May, 2025, P. 72-81
e-ISSN: 3048-1244 (online)
https://jurnal.sinesia.id/index.php/Sinesia-JPS

Improving Teenagers' Knowledge and Attitudes Towards Anaemia and Blood Groups Through a Comprehensive Education Programme at Dr. Soetomo High School, Surabaya

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Info Article
|**Submitted**: 4 June 2025|**Revised**: 16 June 2025|**Accepted**: 22 June 2025
How to cite: Cityta Putri Kwarta, etc., "Improving Teenagers' Knowledge and Attitudes Towards Anaemia and Blood Groups Through a Comprehensive Education Programme at Dr. Soetomo High School, Surabaya", *Sinesia : Journal of Community Service*, Vol. 2, No. 1, May, 2025, P. 72-81.

ABSTRACT

Adolescence is a vital stage of development involving rapid physical and psychological changes that increase nutritional demands. Iron-deficiency anaemia is a widespread health problem among Indonesian teenagers, negatively affecting concentration, energy levels, and immune function. Equally important is adolescents' awareness of their blood group, which is critical for emergency medical treatment but often overlooked. Education targeting these issues is necessary to improve adolescent health outcomes. Methods: This community program at SMA Dr. Soetomo Surabaya included interactive educational sessions led by health experts and university students. Various learning tools such as videos, posters, and leaflets were used. Students' knowledge was measured using questionnaires before and after the sessions. Results: The intervention led to notable improvements in students' understanding of anaemia's causes, symptoms, and prevention strategies. Pre-test to post-test analysis revealed a significant increase in anaemia knowlede, with average scores improving from 60% to 85%. Awareness about blood groups (ABO and Rh) also increased, with knowledge scores rising from 55% to 80%. This was accompanied by increased motivation to adopt healthier habits and learn their blood group. Formation of student health teams and use of digital platforms supported ongoing health promotion. Conclusion: The program successfully enhanced adolescents' knowledge and health awareness. Engaging, school-based education with peer participation can foster long-term positive behavior changes. Expansion of such programs is recommended for sustained impact.

Keywords: *adolescence, blood group, health awareness*

Introduction

Adolescence is one of the most critical periods in the human life cycle, a complex and dynamic phase of transition(WHO, 2025). During this age range, individuals experience rapid and significant physical, hormonal, psychological, and social changes. The adolescent body grows rapidly, organs develop, and the endocrine system undergoes major adjustments(Chiang et al., 2022). Therefore, it is not surprising that nutritional needs increase significantly to support this optimal growth and development. Adequate and balanced nutrition is the foundation for excellent physical and mental health in the future. Unfortunately, despite high nutritional needs, adolescents, especially in Indonesia, are often vulnerable to various health problems(Marceau et al., 2015). One of the most prominent and urgent is anaemia. Iron-deficiency anaemia is the most common group of anaemia, caused by insufficient intake of iron, which is essential for haemoglobin

production(WHO, 2024). This condition can have various negative and harmful effects. Cognitively, anaemia can cause decreased concentration, difficulty focusing, and impaired memory, ultimately affecting academic performance. Physically, adolescents with anaemia often experience chronic fatigue, lethargy, and weakness, hindering daily activities and participation in physical activities. Furthermore, anaemia can also weaken the immune system, making adolescents more susceptible to infections and illnesses(Kementerian Kesehatan RI, 2023).

On a broader scale, this condition can hinder individual productivity and prevent them from reaching their full potential. Health data indicates that the prevalence of anaemia among adolescents remains a serious national concern, suggesting that this issue has not been adequately addressed and requires ongoing intervention. Basic Health Research revealed that the prevalence of anaemia in adolescents in Indonesia reached 32%, meaning approximately one in three adolescents suffers from anaemia(Kementerian Kesehatan Republik Indonesia, 2024). The high prevalence is consistent with findings from previous local studies on adolescent health in Indonesia about anaemia(Dewi et al., 2024; Randayani Lubis & Angraeni, 2022) In addition to anaemia, there is another important aspect of individual health that is often overlooked among adolescents: knowledge of one's blood group(Hemmatipour et al., 2024). Blood group information may seem trivial to some, but it is actually vital and has far-reaching implications. Most importantly, knowing one's blood group is crucial for emergency blood transfusions(Romanos-Sirakis & Desai, 2025). In critical medical situations such as accidents or surgeries, this information can save lives by enabling the rapid identification of compatible blood donors and recipients. However, the importance of blood group does not stop there; this information is also crucial for long-term health planning(PMI, 2025).

A lack of understanding about these two fundamental health issues, anaemia and the importance of knowing one's blood group, can significantly impact the quality of life for teenagers today and in the future. Teenagers who are unaware of their anaemia status may experience persistent fatigue and difficulty concentrating without knowing the cause, while ignorance about blood group can be a barrier in medical emergencies. Therefore, there is an urgent need for effective and engaging educational and awareness campaigns are needed to equip teenagers with comprehensive understanding of these health aspects. These programmes are designed to be engaging and easy to understand, equipping teenagers with the necessary knowledge and awareness, empowering them to take proactive steps in maintaining their health, and ultimately fostering a healthier, smarter, and more productive younger generation. This community service program aims to provide engaging and easy to understand education oh the prevention and management of anaemia, as well as the critical importance of knowing one’s blood group,

empowering teenagers to take proactive steps in maintaining their health and ultimately fostering a healthier, smarter, and more productive younger generation.

Methods

This community engagement program was implemented in several structured steps. The initial phase involved coordination with SMA Dr. Soetomo Surabaya, including discussions with school leadership to introduce the proposed activities, request formal approval, and synchronize schedules and technical arrangements. Once the coordination was established, the team developed educational content focused on blood group awareness and anaemia, tailored to suit the interests and comprehension levels of adolescents. Materials were presented using various media such as slide presentations, short videos, posters, infographics, and printed leaflets. A dedicated team of facilitators was assembled, consisting of lecturers, university students, and health professionals with relevant experience in public health education. Their responsibilities included delivering material and guiding discussions during the sessions.

The participants of this program were 150 students from SMA Dr. Soetomo Surabaya, comprising students from various grades (10^{th}, 11^{th}, and 12^{th} grade). These students were selected to ensure a diverse representation of adolescent population within the school, allowing for a broader impact of the educational intervention. In preparation for outcome evaluation, the team created pre-test and post-test questionnaires to assess students' knowledge and awareness before and after the educational intervention. The main activity consisted of interactive educational sessions conducted in classrooms or common school areas. These sessions encouraged active participation through open discussions, real-life examples, and Q&A opportunities. After the sessions, students were asked to complete the post-test to assess any improvements in understanding. Data analysis for knowledge and awreness improvement was conducted using a paired t-test to comparethe mean scores of the pre-test and post-test questionnaires. A significant p-value ($p<0.05$) would indicate a statistically significant increase in knowledge and awareness following the intervention. At the conclusion of the program, a full report was prepared, documenting each stage of the activity, the methodological approach, and data collection process. The report also outlined suggestions for future activities and offered recommendations for maintaining health education awareness within the school environment. Program documentation, including photographs, participant engagement, and materials used, was collected throughout the implementation to provide visual evidence of the activities.

Figure 1. Educational session in progress at SMA Dr. Soetomo Surabaya.

Figure 2. Blood type testing being conducted during the community engagement program.

Theoretical Overview

1. Anaemia in Adolescents

Anaemia is a health issue that occurs when the number of red blood cells or the concentration of hemoglobin in the blood is lower than normal, thereby reducing the oxygen transport function to body tissues(WHO, 2024). In adolescents, iron deficiency is the most common cause of anaemia, often due to insufficient dietary intake, increased nutritional demands during growth, and menstrual blood loss in females(da Silva et al., 2022). This condition may lead to various negative impacts, including tiredness, poor concentration, learning difficulties, and developmental delays. Data from Indonesia's national health surveys, indicate that anaemia remains prevalent among school-age youth, especially teenage girls. This highlights the urgency of implementing preventive and educational strategies within schools(Endang Achadi et al., 2018; Kementerian Kesehatan RI, 2023).

2. Awareness of Blood Group and Its Relevance

Blood grouping is based on antigenic markers found on red blood cell surfaces, particularly those classified under the ABO and Rhesus systems(Kumar & Nedunchezhiyan, 2022). Knowing one's blood group is crucial, especially in emergency settings that require urgent blood transfusion decisions. Furthermore, it has implications in maternal and child health, as Rhesus incompatibility between a mother and her fetus can cause serious complications(Ojeka et al., 2021). Despite its critical role, awareness of blood group among adolescents is often low(Pardeshi, 2023). Promoting knowledge in this area can help prepare students for emergency situations and enhance their understanding of personal health risks.

3. Adolescent Health Education

Effective health education for adolescents should be developmentally appropriate, engaging, and relatable(Siddiqui et al., 2019). Young individuals tend to respond positively to interactive methods that involve open communication, peer involvement, and practical scenarios. Schools are a strategic setting for delivering health education, as they provide consistent access to students and foster an environment suitable for long-term learning(Pascoe et al., 2020). Educational interventions in schools that incorporate visual materials, peer-led discussions, and youth participation, such as through student organizations, can significantly improve health literacy and encourage behavioral change among adolescents(Pascoe et al., 2020).

Results and Discussion

The implementation of the community engagement program at SMA Dr. Soetomo Surabaya yielded several significant outcomes, reflecting the effectiveness of a structured, interactive, and student-centered approach. One of the main achievements was the increased level of understanding among students regarding anaemia. Post-intervention assessments revealed a clear improvement in their knowledge about the definition, causes, symptoms, health impacts, and preventive strategies related to anaemia(Kementerian Kesehatan RI, 2023). Specifically, a comparison of pre-test and post-test scores demonstrated a statistically significant increase in knowledge, with average scores rising from an initial 60% (pre-test) to 85% (post-test) ($p<0.001$). The significant improvement directly addresses the national concern of high anaemia prevalence among adolescents, as highlighted in the introduction, proving that targeted educational interventions can effectively bridge knowledge gaps. The students demonstrated greater awareness of the importance of balanced nutrition, especially the intake of iron, vitamin C, and folic acid, as a preventive measure. This heightened understanding also contributed to their ability to recognize potential signs of anaemia among themselves and their peers(Badan Kebijakan Pembangunan Kesehatan, 2022).

Another important result was the increased awareness and understanding of blood groups and their relevance (Kumar & Nedunchezhiyan, 2022). Similar to anaemia knowledge, post-test scores for blood group awareness showed a substantial rise from an average of 55% (pre-test) to 80% (post-test) ($p<0.001$), idicating a significant improvement in their grasp of the ABO and Rhesus blood group systems. After participating in the educational sessions, many students showed an improved grasp of the ABO and Rhesus (Rh) blood group systems. They expressed a better appreciation of the practical significance of knowing one's blood group, particularly in the context of medical emergencies and future blood donation opportunities. This shift in awareness was also supported by students' increased motivation to learn their own blood group, especially those who had not previously known it. The program also succeeded in strengthening students' motivation to adopt healthier lifestyles. This finding is consistent with similar education programs that successfully improved adolescent health literacy, as reported in (Abror, 2023; Apriyani, 2024; Rahmawati et al., 2023). Through participatory activities, interactive discussions, and relatable content, students became more conscious of the importance of maintaining their health(WHO, 2025). Many were inspired to engage in healthier dietary practices and to seek and document their blood group information for future use. The peer education component and student involvement in dissemination efforts further supported this behavioral shift.

In addition, the program contributed to fostering a more health-conscious school environment. Educational materials, such as posters and digital content, were made available throughout the school and shared via communication platforms like WhatsApp and Instagram. These efforts reinforced key health messages and helped create an atmosphere where students and school staff are more engaged in discussions around health. The formation of trained student health ambassadors also ensured that the messages delivered during the program would continue to be disseminated, promoting sustainability beyond the initial intervention. Several tangible outputs were also produced. A comprehensive report documenting the program's planning, execution, and evaluation was developed, including a comparison of pre-test and post-test results that demonstrated knowledge gains. An academic article was submitted to a scientific journal to disseminate findings to a broader audience. Additionally, the creation of accessible and attractive health education materials, such as leaflets and infographics, ensured that the information could continue to be used within the school community. The program also enhanced the capacity of school staff and student organizations to continue health promotion activities independently in the future.

Despite the successful outcomes, the implementation faced several challenges. One notable challenge was initial student engagement, particularly in

encouring active participation during the first few sessions. Some students were hesitant to ask questions or share their experiences due to shyness or a lack of familiarity with interactive learning methods. To address this, facilitators emploed ice-breaking activities, small group discussions, and Q&A sessions to create a more comfortable and inclusive environment. This approach gradually increased student confidence and participation. Another challenge was time constraints within the school curriculum. Integrating the educational sessions without disrupting academic schedules required flexible planning and close coordination with school authorities. To overcome this, the team optimized session durations, focused oh high-impact content, and utilized existing school activity slot. Finally, ensuring long term sustainability of the program's impact after the direct intervention posed a challenge. To mitigate this, the program incorporated the training of student health ambassadors and encouraged the school to integrate anaemia and blood group awareness into their regular health promotion activities.

Conclusion

In summary, the community engagement program implemented at SMA Dr. Soetomo successfully enhanced students' knowledge and awareness of anaemia and blood groups. This initiative highlights the vital role of collaborative health promotion in schools as a means to empower adolescents and build a foundation for healthier communities.

Advice

Expanding this initiative to include parents, local health authorities, and digital platforms could further enhance outreach and impact. By situating this effort within broader public health goals, the program underscores the critical role schools play in promoting adolescent health literacy. Continued collaboration between educational institutions and health professionals is essential to maintain and build upon these achievements, encouraging widespread adoption of similar programs that empower youth and contribute to healthier communities.

Acknowledgements

The authors would like to express their sincere gratitude to the management and staff of SMA Dr. Soetomo Surabaya for their support and cooperation throughout the implementation of this community engagement program. We also thank the students who actively participated and contributed to the success of the activities. Special appreciation goes to the academic advisors, health practitioners, and student volunteers who dedicated their time and expertise as facilitators and trainers. Lastly, we acknowledge the funding and resources provided by [insert

relevant institution or sponsor], which made this project possible. Their combined efforts were invaluable in achieving the program's objectives and promoting health awareness among the youth.

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Biography

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