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Improving The Role Of Family In Preventing Anemia In Adolescent Girls Through Health Education: A Systematic Literature Review

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ABSTRAK

Anemia in adolescent girls is a significant global health problem, with a high prevalence in developing countries, including Indonesia, and can adversely affect physical, mental health, and academic performance. This study aims to analyze the role of families in preventing anemia in adolescent girls through health education and evaluate the effectiveness of family-based interventions. The method used was a systematic literature review by collecting data from various relevant scientific articles published in the last 10 years. The results showed that family involvement, especially mothers, in educating about the importance of consuming iron-rich foods and monitoring iron supplements proved effective in reducing the prevalence of anemia in adolescent girls. Intervention programs that involve families in nutrition education also show increased awareness and changes in healthier eating habits. However, challenges such as economic limitations, culture, and parents' education level are still barriers that need to be overcome. The implication of this study is the need to develop more comprehensive and family-based anemia prevention programs, as well as policies that support access to nutritious foods and iron supplements. Collaboration between the health, education and government sectors is essential to create a supportive environment for sustainable anemia prevention efforts.

Keywords: Anemia, Adolescent Girls, Family, Health Education

INTRODUCTION

Anemia is a medical condition that occurs when the number of red blood cells or hemoglobin levels in the blood are below normal values, reducing the blood's ability to transport oxygen throughout the body (Radjulaeni, 2024). Hemoglobin is the main protein in red blood cells that binds oxygen and distributes it to tissues and organs (Putri, 2024). When the body lacks hemoglobin or red blood cells, organs do not get adequate oxygen supply to perform their functions optimally. This condition can be caused by various factors, including iron, vitamin B12, or folic acid deficiency, blood loss due to heavy menstruation

or injury, to genetic disorders such as thalassemia and sickle cell anemia. Iron deficiency, known as iron deficiency anemia, is the most common type of anemia, especially in developing countries (Bathla, 2022). Common symptoms of anemia include fatigue, pallor, dizziness, shortness of breath, and rapid heart rate, which often reduce the quality of life of sufferers (Wagh, 2024).

Acute blood loss, such as that resulting from trauma or surgery, or chronic blood loss, such as in heavy menstruation or gastrointestinal bleeding, can lead to anemia if the body cannot replace the lost red blood cells quickly enough (Putri, 2024). Impaired red blood cell production is often caused by a lack of essential nutrients, such as iron, vitamin B12, or folic acid, which are necessary for the formation of hemoglobin and red blood cells in the bone marrow (Hafiza, 2024). In addition, some medical conditions such as chronic kidney disease, cancer, or chronic infections can impair the body's ability to produce red blood cells (Ganz, 2024). Meanwhile, hemolytic anemia occurs when red blood cells are destroyed faster than they can be replaced, due to autoimmune disorders, infections, or genetic factors (Adekeye, 2024). With a wide-ranging impact on an individual's health, anemia requires proper diagnosis and comprehensive treatment to address the underlying cause while preventing long-term complications.

Anemia in adolescent girls is one of the global health problems that remains a major challenge, especially in developing countries that have limited access to health services and nutrition education (Wahyuni, 2024). Anemia is currently a serious global health challenge, affecting about 30% of women and girls aged 15-49 years worldwide, which is about 586 million people. In addition, the World Health Organization (WHO) reports that 41% of children under 5 years of age, equivalent to approximately 245 million children, are anemic globally (WHO, 2021a). This high number reflects the low awareness of the importance of a balanced nutritious diet and the availability of access to iron-rich food sources. Adolescent girls are particularly vulnerable to anemia due to increased iron demand during growth as well as factors such as menstruation, inadequate diet, or pressure from unhealthy dietary trends (Nduku, 2022). This condition is particularly worrisome as it can lead to decreased energy, low endurance, and impaired concentration, thus having a direct impact on adolescent productivity and development.

The impact of anemia in adolescent girls is not only limited to individual aspects but also extends to affecting public health and the quality of human resources. Anemia suffered in adolescence can have long-term consequences, such as an increased risk of future pregnancy complications and reduced work capacity, which indirectly burdens the national health system (Obeagu, 2024). In addition, the social impact of anemia cannot be ignored, as adolescents who experience chronic fatigue or lack of concentration are likely to face barriers in education and social participation. Adolescent girls are a particularly vulnerable group to anemia, especially as iron requirements increase significantly during puberty (Naseri, 2024). The rapid growth process at this age requires optimal nutrient intake, including iron, to support the formation of sufficient hemoglobin in the body. An unbalanced diet is often an obstacle to fulfilling this need. Many

adolescent girls consume low-nutrient foods, such as fast food or processed snacks, which have very low iron content (Musfira, 2024). On the other hand, consumption of ironrich foods, such as red meat, green vegetables, or legumes, tends to be neglected, either due to a lack of awareness of the importance of these nutrients or economic and cultural limitations that restrict access to nutritious foods.

Adolescent girls are particularly vulnerable to anemia, especially as iron demand increases significantly during puberty (Simangunsong, 2024). At this age, the rapid growth process requires optimal nutrient intake, including iron, to support the formation of sufficient hemoglobin in the body. Iron plays an important role in the formation of red blood cells that carry oxygen throughout the body, so iron deficiency can interfere with metabolic processes and the physical and mental development of adolescents. Therefore, fulfilling adequate iron needs is very important to maintain the health and continuity of body functions during puberty. Poor eating habits, such as skipping breakfast or consuming drinks that inhibit iron absorption, such as tea and coffee, also worsen the condition of anemia in adolescent girls (Mayanti, 2024). The impact is not only felt physically, such as chronic fatigue and dizziness, but also affects the cognitive function of adolescent girls. Decreased concentration ability due to anemia often leads to decreased academic performance and motivation to learn (Samson, 2022). This condition not only hampers the individual potential of adolescents but also creates greater challenges in producing a productive and competitive young generation. Families have a strategic role in preventing anemia, especially through providing balanced nutritional intake and monitoring daily diet. As a vulnerable group, adolescent girls need special attention regarding their iron needs, which are often unmet due to a less nutritious diet or unhealthy eating habits. However, many families do not have an adequate understanding of the importance of iron and anemia prevention measures. This is where health education plays an important role in improving families' knowledge about anemia and how to effectively prevent it.

Health education provides an important foundation for families to understand the causes, symptoms and effects of anemia, while providing practical guidance in modifying the lifestyle and diet of adolescent girls (Clement, 2023). This approach not only focuses on the adolescent herself but also involves all family members to create a supportive environment for anemia prevention. Education about iron-rich food sources, the importance of vitamin C to increase iron absorption, and how to avoid consuming foods that inhibit iron absorption, such as tea and coffee, can strengthen the family's role in this effort. Although many studies have been conducted on the prevention of anemia in adolescent girls, the role of the family in the context of health education is often overlooked. This is important to highlight, as the family is the first and primary environment in which an adolescent grows and develops. A systematic literature review can help identify the most effective health education strategies in enhancing the family's role in anemia prevention. It can also provide insight into the challenges families face in implementing a healthy lifestyle to prevent anemia. This article

aims to explore the literature that addresses the effectiveness of health education in improving family roles to prevent anemia in adolescent girls. Using a systematic approach, this review is expected to make a meaningful contribution to the development of more targeted and sustainable family-based intervention programs. In addition, this review is also expected to serve as a basis for further research in designing more inclusive public health policies.

RESEARCH METHODS

This study used a systematic literature review method to explore the role of families in preventing anemia in adolescent girls through health education. This method was chosen to gain a comprehensive and evidence-based understanding of effective intervention strategies. The data sources used included research articles, policy reports, and scientific reviews accessed through trusted academic databases, such as PubMed, Scopus, ScienceDirect, and Google Scholar. The keywords used in the literature search included "family role in anemia prevention," "health education and anemia," "adolescent girls and anemia," and "family-based intervention for anemia." Relevant literature included articles published within the last 10 years, discussing anemia prevention in adolescent girls, involving family roles and health education, and written in English or Indonesian. Meanwhile, exclusion criteria included studies that were not relevant to the focus of the study, such as those using populations beyond adolescent girls, articles that were not accessible in full text, or did not address family-based health education. Data analysis was conducted thematically to identify patterns, relationships and gaps in the literature. The results of the selected studies were synthesized narratively to provide a comprehensive picture of the effectiveness of family health education in the prevention of anemia in adolescent girls, as well as to provide recommendations for the development of more effective intervention strategies.

RESULTS AND DISCUSSION

These studies identified that the role of the family in the prevention of anemia in adolescent girls is significant, especially through health education that focuses on nutritious diets and healthy living habits (Cusquisibán-Alcantara, 2024); (Naibaho, 2024); (Yanniarti, 2024). In this context, families play a key role in shaping healthy eating habits in adolescents. Based on literature analysis, families who have adequate knowledge about anemia tend to be able to provide iron-rich foods needed by adolescents (Widyawati, 2024). Some of these foods include red meat, green vegetables, eggs and beans, which are important sources of nutrients to prevent anemia (Mahfouz, 2024). Thus, effective health education for families can be a strong first step to address this issue. In addition to diet, research also shows that family-based intervention programs have a positive impact on anemia prevention (Mulianingsih, 2024). Programs such as nutritious food cooking training and health counseling not only increase parents' knowledge, but also motivate them to be more active in supporting children's health. Cooking training can teach families how to process food ingredients so that their iron content remains optimal, while health counseling helps families understand the importance of regular health checks. The intervention proved successful in increasing family awareness of the importance of

anemia prevention, thereby creating a supportive environment for holistic health of adolescent girls.

The success of health education involving families is also supported by data showing a decrease in the prevalence of anemia among adolescent girls. This confirms that a family-based approach is not only effective, but also sustainable in the long term. By involving families, anemia prevention programs can touch deeper emotional and social aspects, such as building a sense of shared responsibility for maintaining the health of family members. Therefore, the role of the family is not only limited to providing nutritional support, but also becoming an active partner in every step of anemia prevention integrated with public health programs. The results showed that active family involvement in iron supplementation programs in adolescent girls had a significant impact on increasing the level of compliance with supplement consumption (Masruroh, 2024). Family, especially the role of mothers, has an important contribution in ensuring that adolescent girls take iron supplements regularly as recommended. Mothers often serve as the primary reminders and supervisors in supporting the sustainability of the program. Studies show that maternal involvement not only improves consumption compliance, but also broadens the family's understanding of the importance of iron for adolescent health, thus creating an environment conducive to anemia prevention efforts.

Programs that integrate family education with iron supplementation have been shown to reduce the prevalence of anemia (Engidaw, 2024). The importance of a collaborative approach that involves families in anemia prevention efforts. Education programs not only ensure the continuation of regular supplement consumption, but also provide families with in-depth knowledge about risk factors, the negative effects of anemia, and preventive measures that can be taken. Thus, families not only act as passive supporters, but also as active change agents in improving the health status of adolescent girls. Family-based interventions have been shown to be effective in changing adolescents' eating habits from consumption of low-nutrient foods to a more nutritious diet. Family education plays an important role in increasing adolescents' awareness of the link between healthy eating and anemia prevention (Vironika, 2024). As a result, educated families tend to be more proactive in providing nutritious foods such as green vegetables, lean meats, beans and other high iron foods. These changes not only contribute to the direct improvement of adolescents' physical health, but also help shape sustainable healthy lifestyles in the family and community environment.

The research findings confirm that families have a very strategic role in the prevention of anemia in adolescent girls. The family, as the closest environment, has a significant influence on the eating habits and lifestyle of adolescents. In this case, family involvement, especially parents, is a key factor in ensuring that adolescents' nutritional needs are optimally met. Family support includes not only the provision of nutrient-rich foods, but also education on the importance of a healthy diet as an effort to prevent anemia. Family involvement in providing adequate nutritional support can prevent adolescents from experiencing iron deficiency, which is one of the main causes of anemia (Mulianingsih, 2024). A healthy diet should include iron-rich foods such as red meat, liver, green vegetables and beans. In addition, consumption of vitamin C, which helps improve iron absorption, is an important component of the daily diet. Avoidance of beverages that inhibit iron absorption, such as tea and coffee, also needs to be taught by the family. With good supervision from parents, adolescents can more easily adopt health-promoting eating habits. This is in line with the behavior change theory which states that the support of the immediate environment, including family, has a major influence on the

formation of individual habits. In this context, the family acts as a change agent that helps adolescents understand the importance of maintaining nutritional intake to prevent anemia. Continuous education by the family also has the potential to strengthen adolescents' awareness of the risks of anemia and preventive measures. Thus, the family is a key element in creating an environment conducive to the formation of healthy eating patterns in adolescents (Wasche, 2021). Therefore, family-based intervention programs are a highly relevant approach in the context of anemia prevention in adolescent girls. These programs can include family training on nutritious menu preparation, strategies to increase adolescent involvement in healthy food choices, and information on the importance of regular health check-ups. By integrating families in this program, anemia prevention efforts can be more effective and sustainable. In addition, family-based programs also help build collective awareness about the importance of maintaining adolescent health as a long-term investment for future generations.

Health education provided to families has a long-term impact on adolescent health, especially in anemia prevention efforts. When families gain adequate knowledge about anemia, they are not only able to prevent iron deficiency in adolescent girls but can also be a source of education for other family members (Sari, 2022). By having a deep understanding of the importance of nutrition and healthy lifestyles, families can create an environment that supports the health of all household members (Michaelson, 2021). This knowledge not only helps in the prevention of anemia but also contributes to the overall improvement of quality of life. The knowledge possessed by families about anemia is an important asset in maintaining sustainable health. Through health education, families can understand the risk factors, symptoms, and appropriate preventive measures to avoid anemia (Simarmata, 2024). This education also encourages families to take an active role in monitoring adolescents' nutritional intake, such as ensuring the consumption of iron-rich and vitamin C-rich foods. In addition, educated families tend to be more proactive in accessing health services for routine check-ups, so that they can detect the risk of anemia early and take the necessary actions. Anemia prevention programs in adolescent girls also need to pay attention to psychological factors that are often an obstacle in implementing a healthy diet (Setiawan, 2023). Many adolescent girls are influenced by unhealthy diet trends, which generally aim to lose weight quickly without paying attention to the needs of essential nutrients such as iron. Social pressure to meet certain beauty standards often leads adolescents to neglect the consumption of nutritious foods, including iron-rich foods. This exacerbates the risk of anemia in this age group, so a comprehensive approach is needed to address this challenge. Families can play a key supporting role in helping adolescent girls adopt a healthy diet. Parents and other family members have the responsibility to create an environment that supports good eating habits, such as providing nutritious food at home and modeling a healthy diet. In addition, families need to understand the importance of supportive communication, so that adolescents feel comfortable discussing eating-related issues and social pressures. In this way, families can help adolescents overcome the pressure to follow unhealthy dietary trends.

Education on the importance of nutrition for long-term health should also be delivered on an ongoing basis, both at the family level and in the school environment. Schools can be a strategic place to integrate health education into the curriculum, such as providing knowledge about iron, food sources that contain iron, and the importance of a balanced diet (Ngobeni, 2024). Educational programs in schools can also involve health workers to provide students with a deeper understanding of the impact of anemia and how to prevent it (Pratiwi, 2024). In addition, the role of families and schools needs to be

supported by the wider community, including community organizations and health services. Health campaigns that raise the issue of anemia in adolescent girls can help raise public awareness about the importance of a healthy diet (Nuraina, 2024). This community-based approach can also help create a more inclusive environment, where adolescent girls feel supported to adopt good eating habits without stigma or social pressure. By integrating psychological factors, family education, school programs, and community support, anemia prevention programs in adolescent girls can become more effective. This holistic approach not only helps prevent anemia, but also builds collective awareness about the importance of adolescent health as an investment in the future. Thus, adolescent girls can grow into physically and mentally healthy individuals, with a better quality of life in the future.

Although the role of families in anemia prevention is very important, the main challenge faced is the lack of basic knowledge about nutrition, especially related to iron requirements (Sutarti, 2024). Many families, especially those living in areas with limited access to information, do not fully understand the impact of anemia and the importance of iron consumption in the daily diet. This ignorance often leads to a lack of attention to food choices that can support the health of the body, especially in meeting the iron needs that are needed by adolescent girls, especially during puberty. As a result, adolescent girls in these families are at risk of iron deficiency that can lead to anemia, which if not properly addressed can affect quality of life in the long run. One of the biggest challenges in anemia prevention is economic factors that limit the ability of families to provide nutritious food (Rahmawati, 2024). Iron-rich foods such as red meat, liver and dairy products are often considered expensive, especially by families with low incomes. When budget constraints become a major obstacle, many families turn to cheaper, yet less nutritious food options, such as fast food or processed snacks. This further exacerbates the problem of iron deficiency, especially in adolescent girls who need more nutrition to support their growth and development. Addressing this issue therefore requires a more holistic approach, which focuses not only on providing information, but also on practical solutions that can be implemented at the family level considering economic limitations.

Proper health education can be key to helping families make smarter and more nutritious food choices even on a budget. One key solution is to introduce families to more affordable sources of iron-rich foods, such as green vegetables, tempeh, tofu and beans. These foods are not only cheaper, but also have a high iron content and can be easily found in local markets. In addition, green vegetables such as spinach, kale and broccoli, which are rich in iron, can be an excellent alternative for increasing iron intake in the daily diet (Ramadhani, 2024). Education that teaches families to utilize these ingredients can help reduce reliance on expensive or less nutritious foods. Knowledge of food processing also plays an important role in ensuring nutritional content is maintained. For example, proper cooking can help increase iron absorption in the body. One way to do this is by combining iron-rich foods with other ingredients that can increase absorption, such as foods rich in vitamin C, like oranges, tomatoes or peppers. In addition, simple and efficient cooking techniques can also save costs, such as steaming or boiling vegetables instead of frying them. With the right knowledge of food processing, families can prepare dishes that are not only nutritious, but also economical and accessible.

CONCLUSION

The conclusion of this study shows that the role of the family is very important in preventing anemia in adolescent girls, especially through health

education based on understanding nutrition and healthy eating habits. Families, especially mothers, play a key role in providing adequate nutritional support, ensuring the consumption of iron-rich foods, and assisting adolescents in taking iron supplements regularly. Educational programs that involve families have been shown to increase parental knowledge and awareness and improve the eating habits of adolescent girls, which in turn helps reduce the prevalence of anemia. However, economic factors, culture, and parents' education level are still major challenges that must be overcome to achieve optimal results. The implication of this study is the importance of developing health intervention programs that actively involve families in the prevention of anemia in adolescent girls. These programs should be tailored to the social, cultural, and economic conditions of the community, by providing education that is easy to understand and can be implemented at the family level. In addition, public policies that support access to nutritious foods, free iron supplements, and nutrition education need to be strengthened to support successful anemia prevention at the community level. Collaboration between the education, health and government sectors is essential to create an enabling environment for sustainable improvements in adolescent girls' nutrition and health.

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