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LEARNING IN CLINICAL CASES

Moringa leaves for anemia treatment among teenagers

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Abstract

Anemia occurs due to the low levels of hemoglobin and carbon dioxide in the tissues. It is essential to provide comprehensive treatment to avoid the negative impacts of anemia. For example, they used herbal therapy for anemia treatment, including moringa leaves. The study aimed to evaluate the use of leaves in anemia. This research design uses a case study using purposive sampling. This research data was taken using participatory observation, interviews, and documentation. This study's results indicate that applying Moringa leaf extract to increase hemoglobin in adolescent girls can increase hemoglobin levels.

Keywords: Teenage girl; hemoglobin; moringa leaf extract; activity intolerance; innovation in health

Introduction

Adolescence is the transition period from childhood to adulthood, and adolescents can be classified into three stages: early adolescence or early adolescent age (10-13 years), middle adolescent or middle teenage age (14-16 years), and late adolescent (17-20 years) (Jaworska & MacQueen, 2015; Sawyer, Azzopardi, Wickremarathne, & Patton, 2018). Nutrients in the blood, particularly hemoglobin levels, can be used to determine the health status of adolescents. The normal hemoglobin level in teenage girls is 12 g/dL, and if the hemoglobin level falls below 12 g/dL, the teenager may experience anemia (Chaparro & Suchdev, 2019). Anemia affects one-third of the world's population and is linked to higher illness and death, lower job productivity, and poorer brain development. Understanding the diverse and complex etiology of anemia is critical for devising effective therapies that address context-specific causes of anemia and monitoring anemia control programs (Chaparro & Suchdev, 2019). Anemia, a condition characterized by a deficiency in red blood cells or hemoglobin, is a significant public health issue affecting teenagers worldwide (Habtegiorgis et al., 2022). During the adolescent years, individuals experience rapid physical and physiological changes, making them particularly vulnerable to the development of anemia. This condition can have far-reaching consequences, impacting the overall health, cognitive development, and quality of life of teenage individuals (Kounnavong, Vonglokham, Kounnavong, Kwadwo, & Essink, 2020). The primary causes of anemia in teenagers are often linked to nutritional deficiencies, particularly in iron, folate, and vitamin B12. Adolescents, especially young women, may experience increased nutritional demands due to growth spurts, menstrual cycles, and other physiological factors. Inadequate dietary intake, poor absorption of essential nutrients, or chronic blood loss can all contribute to the onset of anemia. Additionally, certain underlying medical conditions, such as chronic infections, inflammatory disorders, or genetic disorders, can also predispose teenagers to developing anemia (Sari, Judistiani, Herawati, Dhamayanti, & Hilmanto, 2022). Addressing the root causes of anemia in this age group requires a multifaceted approach, including targeted nutritional interventions, improved access to healthcare services, and comprehensive health education programs that empower teenagers to make informed choices about their dietary and lifestyle habits.

Globally, the prevalence of anemia in teenagers is estimated to be around 37.3 %, with the highest rates observed in developing countries and regions with limited access to healthcare and adequate nutrition (Sahoo et al., 2023). Factors such as poor dietary intake, menstrual blood loss, and underlying medical conditions can contribute to the high prevalence of anemia in this age group. Adolescent girls, in particular, are at a higher risk of developing anemia due to the increased iron requirements during menstruation and growth spurts. The high prevalence of anemia in teenagers is particularly alarming, as it can have far-reaching consequences on their physical and

cognitive development. Anemia in teenagers can have a significant impact on both their physical and cognitive development, with far-reaching consequences. Anemia can severely impair the physical development of teenagers. The reduced oxygen-carrying capacity of the blood due to low hemoglobin levels can lead to fatigue, weakness, and decreased exercise tolerance (Wiafe, Ayenu, & Eli-Cophie, 2023). This can limit the ability of teenagers to participate in physical activities, sports, and other forms of exercise, which are crucial for their overall physical growth and maturation. Anemia can also contribute to delayed puberty, impaired muscle development, and a higher susceptibility to infections, further compromising the physical well-being of affected teenagers. The impact of anemia on cognitive development in teenagers is equally concerning. Hemoglobin is responsible for transporting oxygen to the brain, and a deficiency in this vital nutrient can result in impaired brain function and cognitive performance (Mosiño, Villagómez-Estrada, & Prieto-Patrón, 2020). Teenagers with anemia may experience difficulties with attention, concentration, memory, and problem-solving skills, which can negatively affect their academic performance and overall learning outcomes. This can have long-term consequences, as cognitive deficits during the critical adolescent years can hinder the development of essential executive functions, decision-making abilities, and social-emotional skills, all of which are crucial for successful transition into adulthood. The combination of physical and cognitive impairments associated with anemia can have a profound impact on the overall well-being and quality of life of teenagers (Tesfaye, Yemane, Adisu, Asres, & Gedefaw, 2015). Addressing anemia in this age group is, therefore, a pressing public health priority, as it can help ensure that teenagers are able to reach their full potential, both physically and intellectually, and successfully navigate the challenges of adolescence and the transition into adulthood.

Teenagers with anemia can experience a range of symptoms, including dizziness, headache, fatigue, faintness, sensitivity to cold, anorexia, stomatitis, and glossitis (Weckmann, Kiel, Chenot, & Angelow, 2023). To avoid further complications, it is necessary to immediately address the nutritional needs of these teenagers, particularly by providing foods that are rich in iron and protein (Mishra, Lakhera, & Pandey, 2021). One potential solution is the consumption of Moringa leaves, which have been shown to improve hemoglobin and serum retinol levels (Khanam et al., 2022). Moringa Oleifera (MO), a member of the Moringaceae family, is a prominent agricultural commodity in Asia and Africa, and its health benefits have been the subject of extensive research (Shija, Rumisha, Oriyo, Kilima & Massaga, 2019). The leaves of MO contain a variety of bioactive constituents, such as vitamins, phenolic acids, flavonoids, isothiocyanates, tannins, and saponins, which have demonstrated potential benefits in various chronic ailments, including anemia (Vergara-Jimenez, Almatrafi, & Fernandez, 2017). Study have shown that increasing the amount and duration of Moringa Oleifera supplementation can lead to a significant reduction in the incidence of anemia, particularly in settings where the use of iron-fortified infant formulas and other products is limited (Shija, Rumisha, Oriyo, Kilima & Massaga, 2019).

Early detection and effective management of anemia in teenagers are crucial, as the condition can have significant long-term implications. Anemia can lead to fatigue, impaired cognitive function, reduced physical performance, and an increased risk of adverse pregnancy outcomes for young women. By implementing comprehensive screening programs, providing accessible and affordable treatment options, and promoting awareness about the importance of maintaining optimal iron and nutrient levels, healthcare systems and policymakers can work to mitigate the burden of anemia and support the overall health and well-being of teenagers in their communities. Symptoms of anemia should be addressed immediately in adolescent girls who need to get serious therapy because the symptoms of anemia experienced by most teen girls are at risk. The effects of such anemia symptoms can lead to decreased learning performance due to tiredness, loss of enthusiasm and inability to concentrate. Unfortunately, the use of moringa leaves for anemia treatment is limited in the literature. The incorporation of Moringa leaves into the normal diet of teenagers, especially those at risk of anemia, could be a promising approach to address this public health concern. Therefore, this study aimed to investigate the benefits of this leaves in adolescent with anemia. It is hoping the finding of the study help nurses in treating anemia particularly in community setting.

Method

The study utilized a case study methodology with purposive sampling to recruit the participants. The selected respondent was a 16-year-old adolescent diagnosed with anemia and activity intolerance. Informed consent was obtained from the participant prior to the commencement of the study. The participant signed the consent form, indicating their agreement to participate in the study. The concept of informed consent holds significant importance

within the contemporary healthcare delivery system. In an optimal scenario, the informed consent process involves an educational dialogue between a healthcare provider, such as a physician or surgeon, and a patient or their family members, enabling them to make an informed decision regarding their healthcare. The consent form was originally designed as a record of the interaction between the patient and the healthcare provider, and it has now evolved into a legal requirement in the field of nursing. Data collection in this study employed multiple methods, including participatory observation, interviews, direct observation, and documentation review. The data collection tool utilized was the SOP (Standard Operating Procedure) application of Moringa leaf extract (**Figure 1**). This research employed a quantitative research approach and a case study research strategy. The activities carried out during the study involved directly performing nursing services to the respondent, conducting interviews to collect data, performing physical examinations, and implementing patient interventions using the SOP (Standard Operating Procedure) Application as the data collection tool.



Figure 1. Illustration of Moringa leaf (*Courtesy of unsplash.com*)

Results

The research was conducted from June 22, 2021, to July 5, 2021. The physical examination was performed on June 22, 2021, and the data obtained indicated a good general condition, normal level of consciousness, signs of anemia (pale appearance, cold extremities), blood pressure of 100/70 mmHg, respiratory rate of 24 breaths per minute, heart rate of 78 beats per minute, and a temperature of 36.2°C. The hemoglobin level was found to be 10.3 g/dL. The primary complaints reported by the client included numbness, excessive sleepiness, dizziness, palpitations with increased activity, and frequent fainting episodes, as well as difficulty concentrating during classroom learning. The client reported eating 3-4 meals per day but disliking the consumption of vegetables, particularly green leafy varieties, and preferring fast food instead. The nursing diagnosis was activity intolerance related to an imbalance between oxygen supply and demand. The client stated that they often experienced fatigue, sleepiness, dizziness, and fainting episodes during and after physical activity, as well as difficulty concentrating in the classroom. The intervention provided to the participant was the addition of moringa leaf extract to their daily meals to increase hemoglobin levels. The evaluation conducted on July 5, 2021, revealed that the participant was no longer

experiencing excessive fatigue, dizziness, or fainting episodes during physical activity, and the hemoglobin level had increased to 10.6 g/dL.

Discussion

The participant reported that there were no restricted foods in their diet, except for vegetables. The participant expressed a dislike for vegetables, particularly green leafy varieties, and often avoided consuming them, preferring fast food instead. Fast food, characterized by its high levels of salt, fat, and sugar, can contribute to the development of anemia through various mechanisms (Ma et al., 2023; Al-Jermmy et al., 2022; Sayed & Nagarajan, 2022). Firstly, fast food typically lacks sufficient iron-rich sources, such as lean meats, beans, and dark leafy greens, which are essential for the production of hemoglobin. Consequently, a diet deficient in iron may lead to iron-deficiency anemia (Ma et al., 2023). Secondly, fast food is often lacking in necessary nutrients like vitamin C and folate, which are crucial for the effective absorption and utilization of iron. Without these nutrients, the body struggles to absorb iron efficiently. Moreover, the high sodium content in fast food can interfere with iron absorption and disrupt the balance of other essential minerals like calcium and magnesium, further impacting red blood cell health. Additionally, the processed nature of fast food and the presence of various additives may hinder nutrient absorption and contribute to inflammation, affecting the body's ability to utilize iron. Overall, the imbalanced nature of junk food diets (**Figure 2**), coupled with their lack of essential nutrients, can increase the risk of anemia and other nutritional deficiencies, highlighting the importance of a balanced and varied diet for overall health.



Figure 2. Illustration of junk foods (Courtesy of unsplash.com).

Teenage girls are one of the groups particularly vulnerable to the problem of nutritional deficiencies. Nutritional status can be defined as the state of balance between the consumption, absorption, and utilization of nutrients. A deficiency of macronutrients, such as energy and protein, as well as a lack of micronutrients like iron (Fe), iodine, and vitamin A, can lead to nutritional anemia, where the deficiency of specific nutrients, especially iron (Fe), affects the formation of hemoglobin (Hb) or red blood cells (Lestari et al., 2018). The participant's symptoms, including easy fatigue, pale appearance, lack of energy, dizziness, and palpitations during increased activity, as well

as difficulty concentrating, are consistent with the clinical presentation of anemia, as described in the literature (Lestari et al., 2018). This is further supported by the participant's hemoglobin level of 10.3 g/dL, which is below the normal range for teenage girls (12 g/dL) (Yulianti et al., 2016). Anemia occurs due to insufficient hemoglobin levels, which impairs the function of oxygen and carbon dioxide exchange in the body's tissues. Factors contributing to the participant's activity intolerance include the low hemoglobin level of 10.3 g/dL, as well as the reported complaints of fatigue, dyspnea during or after activity, and an increased heart rate (Nurainni, 2019). To address this, the intervention provided was the administration of capsules containing moringa leaf extract. Moringa leaves are known to be rich in iron, with a higher iron content compared to spinach (Yulianti et al., 2016). The consumption of moringa leaf extract can potentially increase hemoglobin levels, as demonstrated in previous studies (Yulianti et al., 2016). The administration of 500 mg of moringa leaf extract capsules per day for 14 days (two weeks) resulted in a 0.3 g/dL increase in hemoglobin levels. However, the increase was not considered significant, as the participant continued to experience delays in meal consumption and a failure to incorporate iron-rich foods, such as green vegetables, into their diet (Hermawan et al., 2020). Consumption of green vegetables can help prevent anemia and meet the body's iron requirements, as they are a good source of this essential mineral (**Figure 3**). Improving the consumption of green vegetables can not only help overcome the participant's activity intolerance but also further increase their hemoglobin levels (Kosasi et al., 2014; Isnaeni et al., 2013).



Figure 3. Illustration of healthy food (Courtesy of *unsplash.com*).

A gradual approach to introducing more vegetables into the participant's diet could be beneficial. Start by incorporating small amounts of green leafy vegetables, such as spinach or kale, into the participant's favorite dishes like pasta or rice bowls. Gradually increase the portion of vegetables over time to help the participant get accustomed to the taste and texture. Disguising vegetables in familiar foods can also be an effective strategy (da Silva Lopes, Yamaji, Rahman, Suto, Takemoto, Garcia-Casal, & Ota, 2021). Blend or finely chop vegetables and incorporate them into sauces, soups, or baked goods, like muffins or smoothies, to help the participant consume vegetables without feeling like they are eating them directly. Offering a variety of vegetables, including different colors and textures, can keep the participant's interest and prevent boredom (Skolmowska, Głąbska, Kołota, & Guzek, 2022). Experiment with new recipes and cooking methods, such as roasting, sautéing, or grilling, to make vegetables more appealing. Involving the participant in meal preparation, such as grocery shopping, meal planning, and cooking, can foster a sense of ownership and investment in the meals, making them more likely to try the

vegetables. Positive reinforcement and role modeling can also be beneficial. Praise and celebrate the participant's efforts to incorporate more vegetables into their diet (Czarniecka-Skubina, Gutkowska, & Hamulka, 2023). Ensure that other family members or caregivers are also modeling the consumption of a variety of vegetables, as this can influence the participant's behavior (Mahmood, Flores-Barrantes, Moreno, Manios, & Gonzalez-Gil, 2021). Avoid abruptly eliminating the participant's preferred fast-food options, as this may lead to resistance. Instead, gradually introduce more nutrient-dense foods, including vegetables, while reducing the frequency of fast-food consumption. Finally, providing the participant with education and awareness about the importance of a balanced diet, the benefits of consuming vegetables, and the potential consequences of a diet lacking in essential nutrients can help them understand the importance of making healthier choices. Healthcare professionals can gradually encourage the participant to incorporate more vegetables into their diet, ultimately improving their overall nutritional status and addressing the underlying anemia.

Conclusion

The promising results from the current study, coupled with the known nutritional profile of moringa leaves, suggest that this natural remedy could be a valuable addition to the arsenal of interventions targeting anemia in teenager. The consumption of moringa leaf extract can potentially help increase hemoglobin levels, as demonstrated in previous studies. Future studies with larger sample sizes and more robust research designs are needed to further evaluate the efficacy of moringa leaf extract in treating anemia among teenagers. Additionally, these studies could explore the optimal dosage, duration of treatment, and potential synergistic effects when combined with other iron-rich foods or supplements. Longitudinal studies tracking the long-term effects of moringa leaf extract on anemia prevention and management would further elucidate its potential as a sustainable and accessible intervention for this vulnerable group.

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Author's perspective

Key points

- Anemia affects one-third of the world's population and is linked to higher illness and death
- Moringa leaf extract can potentially help increase hemoglobin levels
- A gradual approach to introducing more vegetables into the participant's diet could be beneficial

Potential areas of interest

- How can the anemia be prevented among teenagers?
- What supportive system to treat anemia?
- When must healthcare professionals perform collaboration to solve anemia?

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