

Relationship between Nutritional Status, Menstrual Health and Anemia among Adolescent Girls

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Abstract: *Adolescence is a critical stage of growth and development during which nutritional requirements increase substantially, particularly among girls because of rapid physical growth and the onset of menstruation. Nutritional status, menstrual health, and anemia are closely interconnected factors that can influence the physical, cognitive, emotional, and reproductive well-being of adolescent girls. Inadequate intake of iron, folate, vitamin B12, protein, and other essential nutrients can contribute to poor nutritional status and increase vulnerability to iron-deficiency anemia. Menstruation further increases iron requirements because of regular blood loss, while heavy or prolonged menstrual bleeding may intensify iron depletion. At the same time, anemia and poor nutrition may contribute to fatigue, weakness, reduced concentration, impaired school participation, and disturbances in menstrual well-being. This review examines the relationship among nutritional status, menstrual characteristics, dietary practices, and anemia in adolescent girls.*

Keywords: Adolescent girls, nutritional status, menstrual health, anemia, iron deficiency, dietary intake.

I. INTRODUCTION

Adolescence represents a period of rapid biological, psychological, and social development. During this stage, the body undergoes substantial changes in height, weight, body composition, hormonal activity, and reproductive maturation. These changes increase the demand for energy, protein, iron, folate, vitamin B12, calcium, and other micronutrients. Adolescent girls have particular nutritional concerns because the onset of menstruation introduces a recurring loss of blood and iron, thereby increasing the risk of iron deficiency and anemia.

The interaction between dietary intake and menstrual blood loss makes nutritional status an important determinant of adolescent girls' health. When dietary iron intake is insufficient to compensate for physiological requirements and menstrual losses, iron stores may progressively decline and eventually result in anemia. Anemia during adolescence can have important consequences because it may be associated with tiredness, reduced physical capacity, poor concentration, impaired learning, and reduced quality of life. Therefore, understanding anemia among adolescent girls requires consideration of both nutritional and menstrual-health factors rather than focusing exclusively on hemoglobin levels.

II. NUTRITIONAL STATUS AMONG ADOLESCENT GIRLS

Nutritional status reflects the balance between nutrient intake and the body's physiological requirements. Among adolescent girls, nutritional status is influenced by dietary habits, socioeconomic conditions, food availability, family practices, physical activity, cultural beliefs, and knowledge about healthy eating. Inadequate dietary diversity is particularly concerning because diets dominated by cereals or other staple foods may provide insufficient amounts of bioavailable iron and other micronutrients.

Iron from animal sources is generally more readily absorbed than non-haem iron from plant foods, while vitamin C can improve the absorption of non-haem iron. Conversely, certain dietary components can reduce iron absorption when

consumed in particular combinations. Poor nutritional status may therefore arise even when overall food intake appears adequate if the diet lacks important micronutrients. Adolescents may also skip meals, consume highly processed foods, or follow restrictive dietary practices because of peer influence, body-image concerns, or changing lifestyles. These behaviors can reduce the intake of nutrient-dense foods and increase the likelihood of micronutrient deficiencies.

III. MENSTRUAL HEALTH AND ADOLESCENT GIRLS

Menstrual health encompasses more than the occurrence of menstruation. It includes knowledge and understanding of the menstrual cycle, appropriate management of menstrual bleeding, access to suitable menstrual materials, adequate sanitation and privacy, freedom from stigma, and the ability to participate normally in education and daily activities. Menstrual characteristics such as age at menarche, cycle length, duration of bleeding, regularity, and perceived menstrual blood loss can provide useful information about adolescent health.

Some girls experience heavy or prolonged menstrual bleeding, which may increase iron loss and contribute to iron deficiency. Menstrual pain and premenstrual symptoms may also affect food intake, school attendance, physical activity, and psychological well-being. Lack of menstrual-health education can result in misconceptions and delayed recognition of abnormal bleeding. Consequently, menstrual-health assessment should form an important component of adolescent health programs, particularly when anemia is suspected.

IV. RELATIONSHIP BETWEEN MENSTRUAL HEALTH AND ANEMIA

The relationship between menstruation and anemia is primarily influenced by the amount of blood and iron lost during menstrual bleeding and the ability of the diet to replace these losses. Normal menstruation involves regular blood loss, and therefore menstruating adolescent girls require adequate iron intake to maintain iron stores. When menstrual bleeding is particularly heavy or prolonged, iron requirements may become greater. If dietary intake and absorption do not compensate for these losses, iron deficiency can develop gradually.

Adolescent girls who experience heavy menstrual bleeding may therefore represent an important group for anemia screening and clinical assessment. However, menstrual bleeding should not be considered the only cause of anemia. Other contributors may include inadequate dietary intake, infections, parasitic diseases, inherited blood disorders, chronic illness, and other micronutrient deficiencies. A comprehensive assessment is consequently necessary to identify the underlying causes of anemia rather than attributing all cases to menstruation alone.

V. DIETARY FACTORS AND IRON-DEFICIENCY ANEMIA

Diet is one of the most important modifiable determinants of iron status. Adolescent girls require iron-rich foods to support growth and compensate for menstrual losses. Good dietary sources include meat, poultry, fish, eggs, legumes, green leafy vegetables, nuts, seeds, and iron-fortified foods. Combining plant-based sources of iron with vitamin-C-rich foods can improve iron absorption. In contrast, inadequate consumption of iron-rich foods may contribute to declining iron stores. Dietary diversity is therefore important because no single food group can provide all nutrients required during adolescence.

Nutrition education should emphasize affordable locally available foods rather than relying exclusively on expensive animal-source foods or commercial supplements. Schools and families can play an important role in promoting balanced meals and healthy food choices. Nutrition interventions may be particularly valuable in communities where adolescent girls have limited autonomy over food selection or where cultural practices restrict certain foods during menstruation.

VI. INTERACTION BETWEEN NUTRITIONAL STATUS, MENSTRUAL HEALTH AND ANEMIA

Nutritional status, menstrual health, and anemia should be understood as interconnected components of adolescent health. Poor dietary intake can reduce iron stores, while menstruation increases the physiological demand for iron. If

menstrual blood loss is high, the nutritional deficit can become more pronounced. Once anemia develops, girls may experience fatigue and reduced physical performance, which can affect their participation in school and daily activities. Poor nutritional status may also coexist with underweight, overweight, or micronutrient deficiencies, demonstrating that anemia is not necessarily limited to girls who appear undernourished. The relationship is therefore multidimensional: dietary inadequacy can increase vulnerability to anemia; menstrual blood loss can increase iron requirements; and anemia can negatively affect overall functioning and well-being. Effective prevention requires simultaneous attention to dietary quality, menstrual-health knowledge, menstrual disorders, and appropriate health services.

VII. CONCEPTUAL REVIEW TABLE

Major factor	Possible influence on adolescent girls	Relationship with anemia	Suggested intervention
Inadequate iron intake	Reduced iron stores and poor nutritional status	Increases risk of iron-deficiency anemia	Iron-rich balanced diet and supplementation when indicated
Low dietary diversity	Multiple micronutrient deficiencies	May increase anemia risk	Dietary diversification and nutrition education
Heavy menstrual bleeding	Increased blood and iron loss	Can accelerate iron depletion	Menstrual assessment and appropriate medical care
Prolonged menstruation	Greater cumulative blood loss	May contribute to iron deficiency	Screening and management of abnormal bleeding
Poor menstrual-health knowledge	Delayed recognition and inappropriate menstrual management	May indirectly increase health risks	School-based menstrual-health education
Poor menstrual hygiene	Discomfort, stigma and possible reproductive-health concerns	Indirect relationship	Access to safe menstrual materials, water and sanitation
Low socioeconomic status	Limited access to nutritious foods and healthcare	Greater vulnerability to anemia	Nutrition support and accessible adolescent services
Skipping meals	Reduced energy and micronutrient intake	May contribute to nutrient deficiencies	Regular balanced meals
Low intake of vitamin C	Reduced absorption of non-haem iron	May increase risk of iron deficiency	Encourage vitamin-C-rich foods with iron sources
Parasitic infections	Blood and nutrient loss in affected populations	Can contribute to anemia	Prevention, diagnosis and treatment
Limited health screening	Anemia may remain undiagnosed	Delays treatment	Routine adolescent health screening
Iron supplementation	Improves iron availability when deficiency is present	Can prevent or reduce iron-deficiency anemia	Appropriate supervised supplementation

VIII. ROLE OF NUTRITION EDUCATION AND HEALTH AWARENESS

Nutrition education can substantially improve adolescents' understanding of healthy dietary practices. Girls should be informed about the importance of iron-rich foods, vitamin C, balanced meals, dietary diversity, and appropriate meal frequency. Education should also address common misconceptions surrounding menstruation and food consumption. In some communities, girls may avoid particular foods during menstruation because of cultural beliefs, which can further restrict dietary diversity. School-based programs can provide an effective platform for delivering nutrition and menstrual-health education because schools reach large numbers of adolescent girls during an important developmental

period. Parents, teachers, community health workers, and healthcare professionals can reinforce these messages at home and in community settings. Awareness programs should not focus only on anemia but should promote broader concepts of adolescent nutrition, menstrual health, personal hygiene, reproductive health, and timely healthcare utilization.

IX. PREVENTION AND MANAGEMENT OF ANEMIA

Preventing anemia among adolescent girls requires a combination of nutritional, educational, clinical, and public-health strategies. Dietary improvement is a fundamental component, with emphasis on iron-rich and nutrient-dense foods. Where dietary measures alone are insufficient, iron supplementation or other micronutrient interventions may be recommended according to national guidelines and individual health needs. Screening can help identify girls with low hemoglobin or other indicators of iron deficiency so that appropriate management can be initiated. Girls reporting unusually heavy or prolonged menstrual bleeding should receive further assessment because menstrual blood loss may be an important contributing factor. Public-health programs should also consider other causes of anemia, including parasitic infections and deficiencies of folate or vitamin B12 where relevant. Combining anemia prevention with menstrual-health education may improve awareness, early recognition, and healthcare-seeking behavior.

Although substantial research has examined anemia and adolescent nutrition separately, greater attention is needed to the interaction between nutritional status and menstrual health. Future studies should examine dietary diversity, iron intake, menstrual characteristics, menstrual blood loss, hemoglobin concentration, anthropometric indicators, socioeconomic factors, and health-related knowledge within the same population. Longitudinal research would be particularly useful for understanding how nutritional status and menstrual patterns influence the development of anemia over time. Research should also examine differences between rural and urban populations and among adolescents from different socioeconomic backgrounds. Intervention studies can evaluate whether integrated school-based programs combining nutrition education, menstrual-health education, screening, supplementation, and referral services produce better outcomes than single-component interventions. Such evidence could help policymakers develop comprehensive adolescent-health programs.

X. CONCLUSION

The relationship between nutritional status, menstrual health, and anemia among adolescent girls is complex and mutually interconnected. Rapid growth increases nutritional requirements, while menstruation creates a recurring need to replace iron lost through blood loss. Inadequate dietary intake, poor dietary diversity, heavy or prolonged menstrual bleeding, limited menstrual-health knowledge, socioeconomic constraints, and inadequate access to healthcare can collectively increase vulnerability to anemia. Anemia may subsequently affect physical capacity, concentration, educational participation, and general well-being. Therefore, anemia prevention should not be addressed through iron supplementation alone. A comprehensive strategy involving balanced nutrition, dietary diversification, menstrual-health education, appropriate menstrual hygiene, early identification of abnormal bleeding, anemia screening, and timely treatment is required. Schools, families, healthcare providers, and public-health institutions should work together to create supportive environments in which adolescent girls can obtain adequate nutrition, manage menstruation safely and confidently, and receive appropriate healthcare when needed.

REFERENCES

1. Daniel, R. A., Kalaivani, M., Kant, S., & Gupta, S. (2023). Prevalence of anaemia among adolescent girls (10–19 years) in India: A systematic review and meta-analysis. *National Medical Journal of India*, 36(4), 233–240.
2. Duggirala, S., Bose, S., & Karuturi, R. D. (2026). Anaemia among school-going adolescent girls in India: A systematic review of prevalence, predictors, and prevention pathways. *Cureus*, 18(3), e104980.

3. Arumugam, P., Manirajan, P., & Sivanandy, P. (2026). Prevalence and risk factors of nutritional anaemia among adolescents in India: A systematic review with meta-analysis of prevalence. *Annals of Medicine*, 58(1), Article 2694147.
4. Tegegne, K. D., et al. (2022). Magnitude and associated factors of anemia among adolescent girls in Ethiopia: A systematic review and meta-analysis. *Archives of Public Health*, 80, Article 209.
5. Mulugeta, A., et al. (2022). Menstrual abnormality, maternal illiteracy, and household factors as main predictors of anemia among adolescent girls in Ethiopia: Systematic review and meta-analysis. *Women's Health*, 18, 17455057221129398.
6. Dutta, M., & Sarkar, M. (2025). Nutritional intake and physical activity in adolescent girls with anemia: A scoping review. *Nutrients*, 17.
7. Duggirala, S., Bose, S., & Karuturi, R. D. (2026). Anaemia among school-going adolescent girls in India: A systematic review of prevalence, predictors, and prevention pathways. *Cureus*, 18(3), e104980.