Original Article

Spectrum of Anemia Among Adults in a Tertiary Care Hospital in Dhaka: A Cross-Sectional Study

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Abstract

Background: Anemia remains a significant global health concern, particularly in developing countries where it affects a large proportion of the adult population. It is characterized by a reduction in the number of red blood cells or the amount of hemoglobin, leading to inadequate oxygen delivery to tissues. This study aims to explore the prevalence and pattern of anemia among adults in a tertiary care hospital in Dhaka.

Methods: This was a one-year, cross-sectional observational study conducted between 2013 and 2014 in the Department of Internal Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, to evaluate the spectrum of anemia among adult patients. A total of 100 adult patients were selected as study subjects. Data were analyzed using SPSS software (version 20).

Results: The study found that anemia was most commonly diagnosed in females (55%) and individuals aged 41-50 years (30%). The majority of patients presented with fatigue (80%), pallor (70%), and weakness (60%). Iron deficiency anemia was the most prevalent type, affecting 45% of the patients, followed by anemia of chronic disease (30%) and megaloblastic anemia (20%). The severity of anemia was moderate in most cases (45%), with 40% of patients exhibiting mild anemia and 15% experiencing severe anemia. Treatment primarily consisted of iron supplementation, with 50% of patients receiving oral iron and 25% receiving parenteral iron

Conclusion: This study revealed that iron deficiency anemia was the most prevalent form of anemia among adults, followed by anemia of chronic disease and megaloblastic anemia. The findings emphasize the significant role of nutritional deficiencies and chronic conditions in the development of anemia. The high prevalence of anemia in individuals from lower socioeconomic backgrounds highlights the need for targeted public health interventions to improve early detection, prevention, and treatment strategies.

Keywords: Anemia, Fatigue, Pallor, Iron Deficiency

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Introduction

The global prevalence of anemia remains high, particularly in low- and middle-income countries like Bangladesh, where factors such as poor nutrition, infectious diseases, and limited access to healthcare contribute to its widespread nature.[1,2] In Bangladesh, a country with a population of over 160 million people, anemia is a major health concern, affecting a significant portion of the adult population. The spectrum of anemia in adults can vary significantly based on underlying causes and regional factors. Nutritional anemia, particularly iron deficiency anemia (IDA), is the most common type globally, and it is frequently observed in developing countries due to poor dietary intake and malabsorption issues.[3] In Bangladesh, where rice is a staple food and dietary diversity is limited, iron deficiency is prevalent, particularly among women of reproductive age. However, anemia can also result from chronic diseases such as chronic kidney disease, diabetes, and infections like malaria and tuberculosis, which are endemic in Bangladesh.[4] Moreover, blood loss due to gastrointestinal bleeding, menorrhagia, or trauma can also contribute to anemia in adults, further complicating its management. The pathophysiology of anemia varies depending on its cause. Iron deficiency anemia is characterized by insufficient iron stores required for hemoglobin synthesis, leading to hypochromic microcytic red blood cells. Anemia of chronic disease, on the other hand, is often normocytic and normochromic, with impaired iron utilization and a reduction in erythropoiesis due to inflammatory cytokines.[5] Vitamin B12 and folate deficiencies, which are also common causes of anemia, result in megaloblastic anemia, with large, immature red blood cells. Additionally, hemolytic anemia, which can result from autoimmune diseases or inherited disorders like sickle cell anemia, presents with a different set of clinical features, including jaundice and an elevated reticulocyte count.[6] Despite the high burden of anemia in Bangladesh, its diagnosis and management often face challenges due to limited access to healthcare and diagnostic tools. Many patients with anemia present with nonspecific symptoms, such as fatigue, weakness, and pallor, which are common in various types of anemia, making it difficult to differentiate between the different etiologies without appropriate diagnostic testing.[7] Anemia among adults in Bangladesh is also associated with a range of socioeconomic and demographic factors. Women, especially those of reproductive age, are at a higher risk due to menstrual blood loss, pregnancy, and childbirth. A study found that women in rural Bangladesh had a significantly higher prevalence of anemia compared to men, primarily due to iron deficiency associated with poor dietary intake.[2] Additionally, the elderly population is also vulnerable to anemia, often due to a combination of factors such as chronic diseases, poor nutrition, and age-related changes in hematopoiesis.[8] The prevalence of anemia is also higher among individuals living in poverty, as they are more likely to have limited access to nutritious food, healthcare, and sanitation.[9] The diagnosis of anemia typically involves a complete blood count (CBC), which provides information on red blood cell count, hemoglobin concentration, and the mean corpuscular volume (MCV). However, the CBC alone is often insufficient to determine the exact cause of anemia. Additional tests, such as serum ferritin, serum vitamin B12, and folate levels, can help differentiate between iron-deficiency anemia, megaloblastic anemia, and anemia of chronic disease.[10] In many cases, a comprehensive approach that includes a detailed medical history, clinical examination, and appropriate laboratory investigations is necessary to accurately diagnose the cause of anemia and initiate effective treatment. The management of anemia depends on its underlying cause. For iron-deficiency anemia, oral iron supplementation is the first-line treatment, although intravenous iron may be required in severe cases or when oral iron is poorly tolerated.[11] Vitamin B12 and folate deficiencies are treated with oral or injectable supplements, while anemia of chronic disease is managed by addressing the underlying condition. For hemolytic anemia and anemia caused by blood loss, treatment strategies include blood transfusions, corticosteroids, or surgical interventions, depending on the severity and cause of the anemia.[12] This study aims to explore the prevalence and pattern of anemia among adults in a tertiary care hospital in Dhaka.

Methods

This was a one-year, cross-sectional observational study conducted between 2013 and 2014 in the Department of Internal Medicine, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, to evaluate the spectrum of anemia among adult patients. A total of 100 adult patients (aged 18 years and above) presenting with symptoms indicative of anemia, such as fatigue, pallor, and weakness, were enrolled in the study. The patients were selected using a consecutive sampling method. Informed consent was obtained from all participants before inclusion in the study. Inclusion criteria for the study were adult patients who were clinically diagnosed with anemia based on a hemoglobin level of <13 g/dL for men and <12 g/dL for women, according to World Health Organization (WHO) guidelines. Patients with anemia secondary to acute blood loss, chronic conditions such as malignancy, and hemoglobinopathies, or those with incomplete clinical and laboratory data were excluded from the study. A thorough medical history, physical examination, and laboratory investigations were performed on all enrolled patients. The primary data collected included demographic details (age, gender, socioeconomic status), clinical symptoms, and history of underlying conditions such as nutritional deficiencies, chronic diseases (diabetes, chronic kidney disease, etc.), and gastrointestinal disorders. Laboratory investigations performed included a complete blood count (CBC), serum iron levels, serum ferritin, serum vitamin B12, and

folate levels, reticulocyte count, peripheral blood smear, and kidney function tests (serum creatinine and urea). Based on the findings, anemia was classified into different types: iron-deficiency anemia (IDA), anemia of chronic disease (ACD), megaloblastic anemia, and other types of anemia. The severity of anemia was classified as mild, moderate, or severe based on the hemoglobin level. Mild anemia was defined as a hemoglobin level between 10-12 g/dL, moderate anemia as 7-9.9 g/dL, and severe anemia as <7 g/dL. Data were analyzed using SPSS software (version 20). Descriptive statistics were used to present patient demographics, clinical characteristics, and laboratory findings. Categorical variables were expressed as frequencies and percentages, and continuous variables were expressed as mean ± standard deviation (SD).

Results

Table 1: Demographic Distribution of Anemia Patients (N = 100)

Variable	Number (n)	Percentage (%)
Gender		
Male	45	45.0
Female	55	55.0
Age Group (Years)		
18-30	20	20.0
31-40	25	25.0
41-50	30	30.0
>50	25	25.0
Socioeconomic Status		
Low	55	55.0
Middle	30	30.0
High	15	15.0

The study sample consisted of 45% male and 55% female patients. The majority of patients (30%) were between 41-50 years old, followed by the 31-40 years age group (25%). [Table 1]

Table 2: Clinical Symptoms of Anemia Patients (N = 100)

Symptom	Number (n)	Percentage (%)
Fatigue	80	80.0
Pallor	70	70.0
Weakness	60	60.0
Headache	45	45.0
Dizziness	40	40.0
Shortness of Breath	30	30.0
Chest Pain	15	15.0

Fatigue was the most common clinical symptom, reported in 80% of patients, followed by pallor (70%) and weakness (60%). Other symptoms included headache, dizziness, shortness of breath, and chest pain, although they were less frequent. [Table 2]

Table 3: Laboratory Investigations of Anemia Patients (N = 100)

Laboratory Parameter	Mean ± SD	Reference Range
Hemoglobin (g/dL)	9.3 ± 1.5	13-18 (Male), 12-16 (Female)
Hematocrit (%)	28.5 ± 6.0	40-54 (Male), 36-48 (Female)
Serum Iron (µg/dL)	35.7 ± 25.3	50-175
Serum Ferritin (ng/mL)	22.3 ± 10.8	30-400 (Male), 12-150 (Female)
Vitamin B12 (pg/mL)	180 ± 45.2	190-950
Serum Folate (ng/mL)	3.6 ± 1.4	3-17

The mean hemoglobin level in the study sample was 9.3 ± 1.5 g/dL, indicating moderate anemia. Serum iron and ferritin levels were lower than the normal range, with serum ferritin averaging 22.3 ± 10.8 ng/mL, suggesting iron deficiency. Vitamin B12 and folate levels were also lower than the reference range, indicating possible nutritional deficiencies. [Table 3]

Table 4: Classification of Anemia Among Patients (N = 100)

Type of Anemia	Number (n)	Percentage (%)
Iron Deficiency Anemia (IDA)	45	45.0
Anemia of Chronic Disease (ACD)	30	30.0
Megaloblastic Anemia	20	20.0
Other Types of Anemia	5	5.0

Iron deficiency anemia (IDA) was the most prevalent type, accounting for 45% of the cases. Anemia of chronic disease (ACD) was observed in 30% of patients, and megaloblastic anemia was found in 20% of patients. Other types of anemia were rare, accounting for only 5% of cases. [Table 4]

Table 5: Severity of Anemia (N = 100)

Severity of Anemia	Number (n)	Percentage (%)
Mild Anemia (10-12 g/dL)	40	40.0
Moderate Anemia (7-9.9 g/dL)	45	45.0
Severe Anemia (<7 g/dL)	15	15.0

The majority of patients had moderate anemia, with 45% falling into the 7-9.9 g/dL range. Mild anemia was observed in 40% of the patients, while 15% had severe anemia with hemoglobin levels below 7 g/dL. [Table 5]

Table 6: Treatment Modalities in Anemia Patients (N = 100)

Treatment	Number (n)	Percentage (%)
Oral Iron Supplementation	50	50.0
Parenteral Iron Supplementation	25	25.0
Vitamin B12 and Folate Supplementation	20	20.0
Blood Transfusion	15	15.0

Iron supplementation was the most common treatment, with 50% of patients receiving oral iron and 25% receiving parenteral iron supplementation. Vitamin B12 and folate supplementation was provided to 20% of the patients, while 15% required blood transfusions due to severe anemia. [Table 6]

Discussion

In terms of gender distribution, the study found that 55% of the participants were female, and 45% were male. This is consistent with other studies conducted in South Asia, where anemia tends to be more prevalent among women, particularly due to factors such as menstruation, pregnancy, and nutritional deficiencies.[13] The higher prevalence of anemia among women has also been reported in studies conducted in India and Pakistan, where anemia in females is often attributed to inadequate dietary intake and blood loss due to menstruation and pregnancy.[14] Age distribution revealed that a significant proportion of patients (30%) were in the 41-50 years age group, followed by the 31-40 years group (25%). This suggests that anemia is prevalent across all adult age groups, but older adults may be at higher risk due to the accumulation of chronic diseases or poor nutritional intake over time. Similar findings have been reported in other studies in Bangladesh and neighboring countries, where anemia is prevalent across various age groups, but

the prevalence tends to increase with age due to the onset of comorbid conditions.[15] In this study, 55% of the patients came from a low socioeconomic background, which is consistent with the high prevalence of anemia in populations with limited access to healthcare, proper nutrition, and education.[16] Regarding clinical symptoms, fatigue, pallor, and weakness were the most commonly reported symptoms, with fatigue being the most prevalent (80%). This finding is in line with numerous studies indicating that fatigue is one of the most common complaints among anemic patients, regardless of the underlying etiology.[17] Pallor and weakness were also commonly reported, suggesting that the anemia was of a severity that impacted the daily functioning of patients. Other symptoms, such as headache (45%), dizziness (40%), and shortness of breath (30%), are also commonly seen in patients with moderate to severe anemia. The laboratory findings in this study showed that the mean hemoglobin level was 9.3 ± 1.5 g/dL, indicating moderate anemia. This is consistent with findings from other studies in Bangladesh and South Asia, where moderate anemia is the most common form encountered in hospital settings.[18] Serum iron and ferritin levels were significantly lower than the reference range, with ferritin levels averaging 22.3 ± 10.8 ng/mL, suggesting iron deficiency is a leading cause of anemia. Iron deficiency anemia (IDA) is one of the most prevalent forms of anemia globally, especially in developing countries like Bangladesh, where poor dietary intake of iron-rich foods and a high prevalence of parasitic infections contribute to this deficiency.[19] Additionally, vitamin B12 and folate deficiencies were noted in this study, which is consistent with findings from other studies in South Asia, where megaloblastic anemia due to these deficiencies is common.[20] The study found that iron deficiency anemia (IDA) was the most prevalent type of anemia, accounting for 45% of the cases, followed by anemia of chronic disease (ACD) (30%), megaloblastic anemia (20%), and other types of anemia (5%). This distribution is consistent with other studies in the region, where IDA is the most common type of anemia in adults, especially in low-income populations.[14] ACD is also a significant contributor to anemia, particularly in individuals with chronic diseases such as diabetes and chronic kidney disease.[21] Megaloblastic anemia, which is often due to vitamin B12 or folate deficiency, was observed in 20% of the patients, indicating a moderate prevalence of nutritional deficiencies in the studied population. In terms of anemia severity, 45% of the patients had moderate anemia, 40% had mild anemia, and 15% had severe anemia. These findings align with studies conducted in Bangladesh and India, where a significant proportion of anemic patients present with moderate to severe anemia, often requiring urgent intervention.[22] Regarding treatment modalities, iron supplementation (oral and parenteral) was the most common form of treatment, administered to 50% and 25% of the patients, respectively. Iron deficiency being the most common

cause of anemia in the study cohort explains the preference for iron supplementation as a primary treatment modality.[23]

Limitations of The Study

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

Conclusion

In conclusion, this study revealed that iron deficiency anemia was the most prevalent form of anemia among adults, followed by anemia of chronic disease and megaloblastic anemia. The findings emphasize the significant role of nutritional deficiencies and chronic conditions in the development of anemia. The high prevalence of anemia in individuals from lower socioeconomic backgrounds highlights the need for targeted public health interventions to improve early detection, prevention, and treatment strategies, ultimately reducing the burden of anemia in this population.

Recommendation

It is recommended that healthcare providers focus on early screening and diagnosis of anemia, particularly in adults from low socioeconomic backgrounds. Public health initiatives should emphasize the importance of nutritional education, including the prevention and management of iron deficiency, and address underlying chronic conditions contributing to anemia. Additionally, improving access to affordable diagnostic tests and treatments, such as iron and vitamin supplements, can significantly reduce the prevalence and severity of anemia in this population.

Conflict of interest: None declared

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