Original Research Article

Investigating Nutritional Anaemia Prevalence Among Patients Seeking Care at Chuadanga Sadar Hospital, Bangladesh

ABSTRACT

Aim and objective: Nutritional Anaemia is a condition resulting from inadequate intake of essential hematopoietic nutrients required for hemoglobin and red blood cell synthesis. It is often acquired through a diet lacking a sufficient quantity of bioavailable nutrients. In addition, exposure to environmental factors such as hookworm, schistosomiasis, and other parasites can cause excessive loss or competition for hematopoietic nutrients. This study aimed to determine the prevalence of nutritional Anaemia among patients receiving care at Chuadanga Sadar Hospital.

Materials and Methods: This study was conducted at the laboratory of Chuadanga Sadar Hospital in Bangladesh. A retrospective and cross-sectional study design was used, and the study population consisted of 96 non-hospitalized patients with suspected nutritional Anaemia. Blood samples were collected from eligible patients, and the Sysmex 500i automated machine was used to analyze the samples. Data on factors associated with nutritional Anaemia were collected through questionnaires and analyzed using the Statistical Package for Social Sciences (SPSS) version 20. The study found a high prevalence of nutritional Anaemia, with factors such as malnutrition and intestinal worm infection being significantly associated with the condition.

Results: This study found that iron deficiency Anaemia was prevalent among 68.0% of children and 77.2% of women, with MCV and MCH serving as useful indicators. The study also identified risk factors for nutritional Anaemia, including intestinal and blood parasites (27.6% and 12.9%, respectively), pregnancy (6.4%), prolonged menstruation (7.7%), and taking food supplements (22.9%). The sample size included 96 individuals.

Conclusion and recommendation: This study found that iron deficiency Anaemia was prevalent among both children and women attending Chuadanga Sadar Hospital, with MCV and MCH serving as useful indicators. Risk factors for Anaemia included environmental factors such as parasitic infections, physiological status such as prolonged menstruation and pregnancy, and nutritional factors such as taking food supplements. The study highlights the need for targeted interventions to improve nutrition, access to healthcare, and prevent parasitic infections to reduce the burden of Anaemia. Limitations of the study include a small sample size and investigation of only two types of Anaemia.

Keywords: IDA, MCV, MCH, Bangladesh.

1. INTRODUCTION

“Red blood cell volume and hemoglobin levels in the blood are reduced in the presence of Anaemia. Hemoglobin is crucial for the transportation of oxygen to bodily tissues and organs” [1]. Nutritional Anaemia encompasses Anaemia caused by a deficiency in iron, folate, vitamins B and B12, as well as trace elements necessary for the synthesis of red blood cells [2]. “Nutritional Anaemia in children is associated with poor mental and physical growth, and can be a significant concern for pregnant women, increasing the risk of preterm birth and low birth weight” [3]. “Anaemia is prevalent worldwide, and while it is more

widespread in underdeveloped nations, it is also common in industrialized countries" [1]. Anaemia prevalence is estimated to be 9% in industrialized countries, whereas it is 43% in less developed nations. Globally, Anaemia affects 47% of children under the age of 5, 42% of pregnant women, and 30% of non-pregnant women aged 15 to 49 [5]. Over 85% of the total Anaemia burden in high-risk categories is attributed to Africa and Asia. Hemoglobin concentration is influenced by factors such as age, sex, smoking habits, and pregnancy status [6]. Anaemia's link with reduced physical and mental productivity makes it a crucial socioeconomic concern. [7].

Previous research has identified several potential factors that may contribute to Anaemia in women, including living in a rural area, being young, being pregnant, and having poor nutritional status [8]. Malaria and helminths have also been identified as significant causes of Anaemia [4].

Despite the government's strong commitment to working with development partners and educational institutions to find solutions, Anaemia remains a significant threat to public health in Bangladesh. The prevalence of Anaemia among children is 37%, while just 19% of women have some degree of Anaemia compared to 22% of children. Women in rural areas (20%) have a slightly higher incidence of Anaemia than those in urban areas (16%) [10]. However, the prevalence of nutritional Anaemia among different age groups and socioeconomic strata is unknown. Therefore, the objective of this study was to determine the prevalence of nutritional Anaemia among patients visiting Chuadanga Sadar Hospital.

2. MATERIALS AND METHODS

2.1 Study area: The research was conducted at the laboratory of Chuadanga Sadar Hospital, which is located in Chuadanga District, Khunla Division, Bangladesh.

2.2 Study design: The study design used was retrospective and cross-sectional. In the retrospective study, the archived data of patients with nutritional Anaemia were retrieved from the laboratory logbook from 25th February to 21st October 2022. Whereas, in the cross-sectional study, qualified outpatients were approached and requested to give voluntary consent to enroll in the study, and the study was conducted from 25th October to 27th December 2022.

2.3 Study population: The study population consisted of patients who were suggested to have nutritional Anaemia and were attending Chuadanga Sadar Hospital, Bangladesh. All patients were selectively included in the sample size of 96 non-hospitalized patients.

2.4 Inclusion criteria: The study included all malnourished children aged between 6-59 months and women aged between 15-49 years who were suggested to have nutritional Anaemia and met other criteria for being enrolled in the study.

2.5 Exclusion criteria: The study excluded patients with chronic diseases, patients who refused to participate, and those suspected to have other types of Anaemia besides nutritional Anaemia.

2.6 Sample Collection: Patient blood samples were collected in EDTA tubes at the phlebotomy service after completing questionnaires about factors associated with nutritional Anaemia. The blood collected in EDTA tubes was directly transported to the Hematology department for complete blood count analysis.

2.7 Sample Analysis: The received samples were mixed properly, aspirated, and analyzed using the Sysmex 500i automated machine. The machine gave results of complete blood count (CBC). The laboratory interpretation of iron-deficiency Anaemia showed that RBC, Hb, Hct were decreased and MCV and MCH were often decreased, resulting in microcytic/hypochromic cells. For vitamin-deficiency Anaemia (vitamin B12/Folic acid deficiencies), RBC, WBC, Platelet, Hb, and Hct were decreased, and MCV was elevated.

2.8 Data Collection: The consent form and questionnaires were administered to the study participants. Laboratory obtained results and patients' records from the haematology service and nutrition services were used during data collection, and the questionnaire was used to collect information related to the factors associated with nutritional Anaemias such as malnutrition, intestinal worm infection (mostly in children), and education level.

2.9 Data Analysis: Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were used to determine the prevalence of nutritional Anaemia. Univariate analysis was used to assess the association of the risk factors with nutritional Anaemia. Factors indicating an association with nutritional Anaemia at a p-value <0.05 were considered significant.

3. RESULTS

The table 1 provides information on the prevalence of different types of Anaemia and associated indicators among children and women in Chuadanga Sadar Hospital. The types of Anaemia investigated in the study were iron deficiency Anaemia and megaloblastic Anaemia, and the indicators of Anaemia were mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH). Among the children, 68.0% had iron deficiency Anaemia with MCV greater than 80 fL and 11.8% had megaloblastic Anaemia with MCV greater than 100 fL. Among the women, 77.2% had iron deficiency Anaemia with MCV greater than 80 fL and 9.3% had megaloblastic Anaemia with MCV greater than 100 fL. Regarding MCH, 53.8% of children and 70.7% of women had iron deficiency Anaemia with MCH less than 28pg. Only 2.5% of children and 1.8% of women had megaloblastic Anaemia with MCH greater than 32pg. Overall, the results suggest that iron deficiency Anaemia was the most prevalent type of Anaemia among both children and women in Chuadanga Sadar Hospital. The findings also indicate that MCV and MCH were useful indicators for differentiating between iron deficiency Anaemia and megaloblastic Anaemia.

Table: 1 Prevalence of Different Types of Anaemia and Associated Indicators among Children and Women

Indicators of Anaemia	Children (n %)	Women (n %)	Types of Anaemia
Mean Corpuscular Volume (MCV)			
>80 fL	28 (68.0)	41 (77.2)	iron deficiency Anaemia
>100 fL	5 (11.8)	5 (9.3)	Megaloblastic Anaemia
Mean Corpuscular Hemoglobin (MCH)			
<28pg	22 (53.8)	37 (70.7)	Iron deficiency Anaemia
>32pg	1 (2.5)	1 (1.8)	Megaloblastic Anaemia

The table shows the risk factors associated with nutritional Anaemia in the study population, with a sample size of 96 individuals. The data is presented in both absolute numbers (n) and percentages (%). The environmental factors considered in the study were having intestinal parasites and having blood parasites. Of the total participants, 27.6% had intestinal parasites and 12.9% had blood parasites. In terms of physiological status, 6.4% of the participants were pregnant, and 7.7% reported having prolonged menstruation. The nutritional factors considered were taking food supplements, and 22.9% of the participants reported taking them. The chi-square test was performed to determine the association between these risk factors and nutritional Anaemia. The degree of freedom (df) was 4, and the chi-square value was 21.88, indicating a statistically significant association between the risk factors and nutritional Anaemia ($p < 0.05$).

Table 2: Risk Factors Associated with Nutritional Anaemia in the Study Population

Risk factors associated to nutritional Anaemia	Nutritional Anaemia (n=96)	
	n	%
Environmental factors		
Having intestinal parasites	27	27.6
Having blood parasites	12	12.9
Physiological status		
Pregnant	6	6.4
Prolonged n1enses	7	7.7
Nutritional factors (Take food supplements)	21	22.9
P-value	**0.0002**	
df	**4**	
x2	**21.78**	

4. DISCUSSION

The present study aimed to determine the prevalence of nutritional Anaemia among patients visiting Chuadanga Sadar Hospital. The findings of the study revealed that iron deficiency Anaemia was the most common type of Anaemia among both children and women in the study population. These findings are consistent with previous research that has identified iron deficiency as the leading cause of Anaemia worldwide [1, 2]. The study also found that MCV and MCH were useful indicators for differentiating between iron deficiency Anaemia and megaloblastic Anaemia. These findings are consistent with previous studies that have suggested that MCV and MCH are essential indicators for diagnosing different types of Anaemia [9].

In terms of risk factors, the study found a significant association between nutritional Anaemia and environmental factors such as having intestinal and blood parasites, physiological status such as prolonged menstruation and pregnancy, and nutritional factors such as taking food supplements. These findings are consistent with previous research that has identified these factors as significant risk factors for Anaemia in women [8]. It is worth noting that the prevalence of Anaemia among women in this study (19%) was lower than the national average in Bangladesh (22%). However, the prevalence of Anaemia among children in the study (37%) was higher than the national average of 47% [5]. This difference in prevalence may be attributed to differences in the study population and sample size. The study's

strengths include its cross-sectional design, which allowed for the collection of data from a diverse group of patients attending the hospital. Additionally, the use of retrospective data from laboratory logbooks provided a broader view of the prevalence of Anaemia in the study population. However, the study also has several limitations. Firstly, the study's sample size was relatively small, which may affect the generalizability of the findings. Secondly, the study only investigated two types of Anaemia, which may not provide a comprehensive understanding of the different types of Anaemia prevalent in the study population. Thirdly, the study did not investigate the possible interactions between risk factors, which may have an impact on the prevalence of Anaemia.

5. CONCLUSION

The study found that iron deficiency Anaemia was the most prevalent type of Anaemia among both children and women, with mean corpuscular volume and mean corpuscular hemoglobin proving to be useful indicators for differentiating between iron deficiency Anaemia and megaloblastic Anaemia. Additionally, the study identified several risk factors associated with nutritional Anaemia, including the presence of intestinal and blood parasites, prolonged menstruation, and poor nutrition. These findings highlight the need for targeted interventions to address the underlying causes of Anaemia, particularly in high-risk populations such as children and pregnant women. Efforts to improve nutrition, increase access to healthcare, and prevent parasitic infections may help reduce the burden of Anaemia and improve overall health outcomes.

ETHICAL APPROVAL

The ethical approval for this study was considered by the District Civil Surgeon Office, Chuadanga under Ministry of Health, Government of Peoples Republic of Bangladesh

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s) as well as parental consent also taken.

REFERENCES

1. Alemayehu, B., Marelign, T., &Aleme, M. (2016). Prevalence of Anaemia and its associated factors among pregnant women attending antenatal care in health institutions of Arba Minch Town, GamoGofa Zone, Ethiopia: a cross-sectional study. Hindawi Publishing Corporation, 1(1), 1-10.
2. Kayiranga, J. (2017). The prevalence of Anaemia and associated risk factors among pregnant women attending Kirehe and Mahama Health Centers (Unpublished memoire). INES-Ruhengeri, Musanze.
3. Senadheera, D., Goonewardene, M., &Mampitiya, I. (2017). Anaemia and iron deficiency in pregnant women attending an antenatal clinic in a teaching hospital in southern Sri Lanka. Ceylon Medical Journal, 62(3), 1-7.
4. Gautam, S., Min, H., Kim, H., &Jeong, H. (2019). Determining factors for the prevalence of Anaemia in women of reproductive age in Nepal: Evidence from recent national survey data. PLoS ONE, 14(6), 1-6.
5. Mohammed, Y. M., Akabat, A. A., Al-Shammakh, A. A., Abdulelah, H. A., & Abdullatif, D. A. (2017). Prevalence and associated factors of Anaemia among pregnant women residing at high altitude in Yemen. American Journal of Health Research, 5(4), 93-98.

6. Maria, F., Alex, B., Daniel, L., Israel, R., Hector, C., & Manuel, O. (2015). Prevalence of Anaemia in Latin America and the Caribbean. Food and Nutrition Bulletin, 36(2), 1-10.
7. Miruna, S. K., Pujitha, W., Lallindra, G., Carukshi, A., Hemantha, S., & Tharanga, T. (2018). The role of heamatological indices in predicting early iron deficiency among pregnant women in an urban area of Sri Lanka. BMC Hematology, 18(37), 1-7.
8. Nawal, S. (2014). Prevalence of iron deficiency Anaemia etiological and prevention. European Journal of Biology and Medical Science Research, 2(2), 55-60.
9. Mukankubana, M. A. (2017). Effect of malnutrition on Anaemia development among children under five years attending Nemba Hospital (Unpublished memoire). INES-Ruhengeri, Musanze.
10. NISR. (2015). Rwanda health demographic survey (2014-2015). Kigali: National Institute Statistics of Rwanda. pp 45-54.