Original Article

Hemoglobin Status of the Hospital Admitted Patients: A Cross-Sectional Study in A District Hospital of Bangladesh

Asish Kumar Debnath,[1] Md.Khalilur Rahman,[2] Md. Azizul Haque,[3] Md. Nurul Islam[4]

Abstract

Introduction: Anemia is a global public health concern, especially in lower and middle income countries like Bangladesh. The present study aimed to find out the hemoglobin level and prevalence of anemia among the patients admitted in a district hospital of Meherpur, Bangladesh.

Methods: This cross sectional study was conducted among 500 patients admitted to Medicine and Gynecology department of Meherpur General Hospital. After enrollment, 2-3 ml of blood sample was collected in EDTA tubes from each patients and hemoglobin level was determined using an automated hematology analyzer for determination of anemia as defined by the WHO. All statistical analyses were carried out using SPSS version 24.0 for a significant p-value <0.05.

Results: The mean (SD) age of the participants was 48.6 (18.9) years and almost 57% of them were female. Mean (SD) of the Hb level among the participants was 9.8 (1.7) g/dL which was significantly higher among men compared to women (10.1 mg/dL vs 9.5mg/dL). Overall prevalence of anemia was 93.8% (mild 25%, moderate 54% and severe 15%) and the prevalence was comparatively higher among women (96% vs 91%). Female sex and older age were significant risk factors of moderate to severe anemia among the participants though other variables like comorbidities and chronic NSAID use were not revealed as significant.

Conclusion: Anemia prevalence was very high among the patients admitted in Meherpur district hospital, especially among female and elderly patients. So, routine assessment and proper management of anemia of the hospital admitted patients is crucial for better treatment outcome.

Keywords: Anemia, Hemoglobin, NSAID, Comorbidity, Bangladesh

TAJ 2021; 34: No-2: 114-121

Introduction

Anemia is a condition in which hemoglobin (Hb) concentration and/or number of red blood cell are lower than normal and insufficient to meet an individual's physiological needs.[1] The top three contributing causes globally are iron deficiency, vitamin deficiency, and hemoglobin disorders like thalassemia, respectively.[2] However, iron deficiency anemia (IDA) itself contributes to more than half of the anemia cases worldwide.[3] According to the report of a global burden of disease study, more than 1.74 billion people from all over the world are suffering from anemia which corresponds to almost one-fourth of the total population.[2] Global prevalence of anemia is highest among under-five children and pregnant women.

[1] Senior Consultant, Medicine, General Hospital, Meherpur
[2] Professor & Head, Department of Medicine, Rajshahi Medical College, Rajshahi
[3] Associate Professor, Department of Medicine, Rajshahi Medical College, Rajshahi
[4] Assistant Professor, Department of Medicine, Rajshahi Medical College, Rajshahi

However, the population group with the most significant number of individuals affected is non-pregnant women.[4] The lower and middle-income countries of Western Sub-Saharan Africa, South Asia, and Central Sub-Saharan Africa have the highest anemia burden.[2] Bangladesh is a lower-middle-income country in South Asia, having more than 160 million people.[5] Nationally representative Bangladesh Demographic and Health Survey (BDHS) conducted in 2011 reported that 42% of the women of reproductive age were anemic. 6 Some other studies conducted during recent years reported similar numbers which is mostly more than 40%.[7,8] The rates in the urban population are slightly lower compared with rural areas (36% vs 45%), but are high enough to pose a considerable problem.[6,7] Anemia was most prevalent in the northern part of the country (50% and 44% in Rangpur and Rajshahi division). In other divisions, it ranged from 37% in Khulna to 46% in Barisal division.[6]

In fact, hospital admitted patients are more vulnerable to suffer from anemia due to different chronic diseases, micronutrient deficiencies or infections.[12] As a result, it is important to understand the pattern of anemia among the hospitalized patients for quality patient care and better treatment outcome. There are very limited studies which explores the frequency of anemia among hospital admitted patients in the northern region and hence, the present study aimed to find out the hemoglobin level and prevalence of anemia among the patients admitted in a district hospital of Meherpur, Bangladesh.

Materials and Methods

The present cross-sectional study was conducted in Meherpur general Hospital from June to December 2020. All the patients admitted in the Medicine and Gynecology department of the hospital was the study population. Patients aged ≥ 13 years, admitted to the aforementioned department, able to conduct the laboratory tests and conscious to provide consent were included in the study. Patients aged <13 years, unconscious, and unable to conduct the laboratory tests were excluded from the study. Systematic random sampling method was used to include patients in the study. All statistical analyses were carried out using SPSS version 24.0. Frequency distribution with percentage was used to describe categorical variables and mean with SD was used to describe continuous variables. Chi-square test and independent t-test were used for comparison between groups in case of categorical and continuous variables respectively. Logistic regression model was used to determine the risk factors of moderate to severe anemia among the participants. All statistical tests were interpreted at 95% confidence interval with a significant p-value of <0.05.

Definition of anemia: According to the WHO guideline. Hemoglobin levels at sea level (g/dL)

Population	Non-anemia	Anemia		
		Mild	Moderate	Severe
Men	≥ 13.0	11.0-12.9	8.0-10.9	<8.0
Non-pregnant women	≥ 12.0	11.0-11.9	8.0-10.9	<8.0
Pregnant women	≥ 11.0	10.0-10.9	7.0-9.9	<7.0

Results

Results: Total 500 patients were included in the present study. Their mean (SD) age was 48.6 (18.9) years. More than half (57%) of the participants were female, 11.4% participants had history of chronic non-steroidal anti-inflammatory drug(NSAID) use. Diabetes mellitus was the most prevalent comorbidity among the participants (17%) followed by hypertension (16.6%) and peptic ulcer disease (9%) (Table 1).

Table 1: Socio-demographic and clinical characteristics of the participants (n=500)

Characteristics	n	%
Age group (years)		
13-17	20	4.0
18-30	93	18.6
31-40	82	16.4
41-50	81	16.2
51-60	90	18.0
61-70	91	18.2
71-80	30	6.0
>80	13	2.6
Gender		
Male	215	43.0
Female	285	57.0
History of chronic NSAID use		
No	443	88.6
Yes	57	11.4
History of comorbidities		
Diabetes mellitus	84	16.8
Hypertension	83	16.6
Peptic ulcer disease	44	8.8
Osteoarthritis	27	5.4
Hemorrhoid	20	4.0
Chronic obstructive pulmonary disease	17	3.4
Asthma	16	3.2
Rheumatoid arthritis	14	2.8
Low back pain	12	2.4
Chronic kidney disease	9	1.8
Ischemic heart disease	7	1.4
Pulmonary tuberculosis	7	1.4

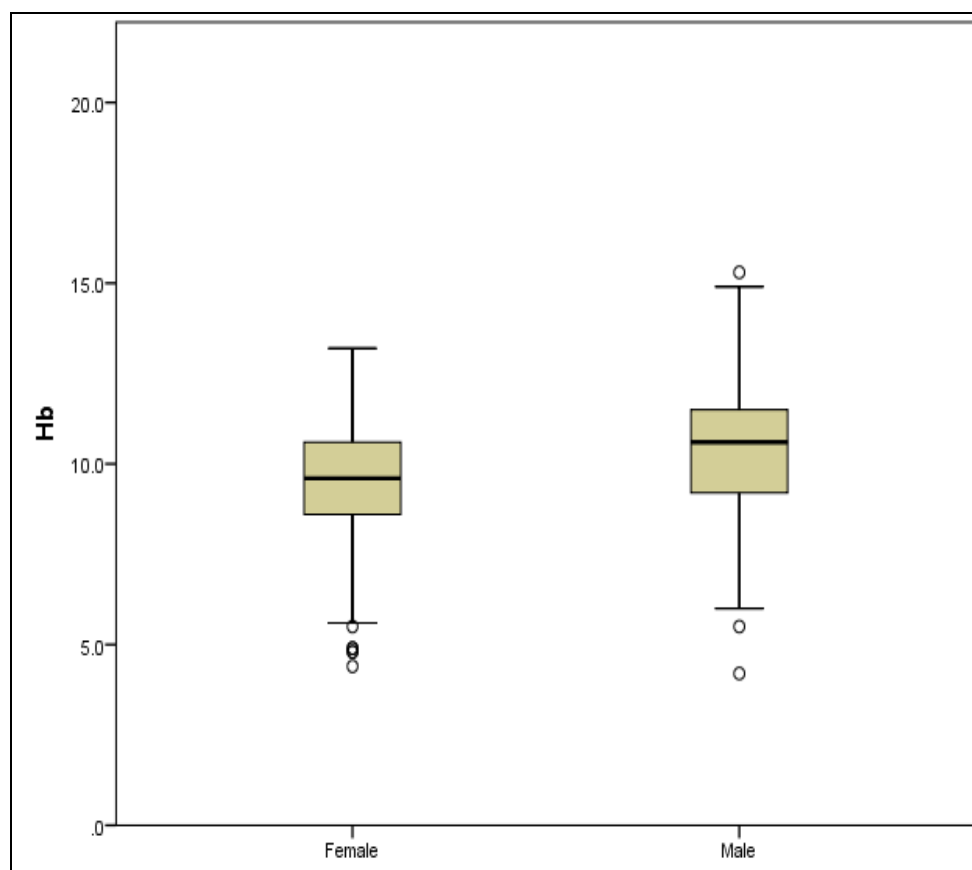| Pregnancy	5	1.0
Anal fissure	4	0.8
Dysfunctional uterine bleeding	4	0.8
Fibroid uterus	4	0.8
FTP	3	0.6
Benign enlargement of prostate	3	0.6
Abortion	3	0.6
Stroke	2	0.4
Hypothyroidism	2	0.4

Figure 1: Hb level according to sex among the participants (N=500)

Mean (SD) of the Hb level among the participants was 9.8 (1.7) g/dL. Mean Hb level was higher among the male participants compared to their female counterpart (mean 10.1, SD 1.8 among male and mean 9.5, SD 1.5among female, p-value of independent t-test <0.001). (Figure 1)

A total of 93.8% participants were suffering from some sort of anemia as defined by the WHO guideline. Among the participants almost 25% were suffering from mild anemia, 54% from moderate anemia and 15% from severe anemia **(Figure 2).**
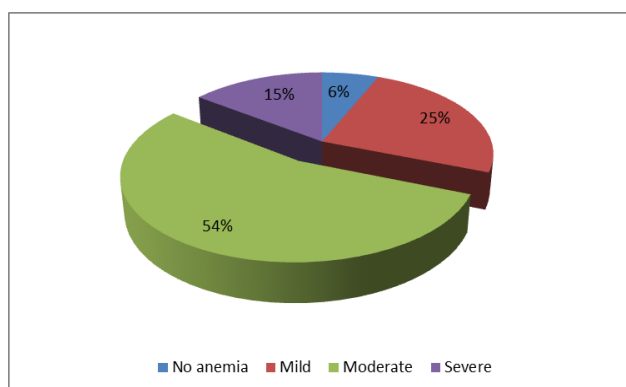
Figure 2: Prevalence and severity of anemia among the participants

Prevalence of anemia was significantly higher among the female participants (96.1%) compared to male participants (90.7%). The prevalence did not differ significantly according to the participants' age or comorbidities (p-value 0.437 for age and 0.278 for comorbidities). Patients having history of chronic NSAID use had a slightly higher prevalence of anemia compared to their counterparts (96.5% vs 93.5%) though it was not statistically significant **(Table 2).**

Table 2: Prevalence of anemia according to severity among the participants (N=500)

Characteristics	No anemia	Anemia			p-value
		Mild	**Moderate**	**Severe**	
Age (years)					
13-17	4 (20.0)	6 (30.0)	9 (45.0)	1 (5.0)	0.437
18-30	6 (6.5)	21 (22.6)	49 (52.7)	17 (18.3)	
31-40	6 (7.3)	16 (19.5)	49 (59.8)	11 (13.4)	
41-50	6 (7.4)	19 (23.5)	47 (58.0)	9 (11.1)	
51-60	5 (5.6)	28 (31.1)	46 (51.1)	11 (12.2)	
61-70	1 (1.1)	27 (29.7)	48 (52.7)	15 (16.5)	
71-80	2 (6.7)	5 (16.7)	17 (56.7)	6 (20.0)	
>80	1 (7.7)	2 (15.4)	7 (53.8)	3 (23.1)	
Gender					
Female	11 (3.9)	43 (15.1)	181 (63.5)	50 (17.5)	<0.001
Male	20 (9.3)	81 (37.7)	91 (42.3)	23 (10.7)	
History of comorbidities					
Yes	18 (5.5)	88 (26.8)	171 (52.1)	51 (15.5)	0.278
No	13 (7.6)	36 (20.9)	101 (58.7)	22 (12.8)	
History of chronic NSAID use					
Yes	2 (3.5)	8 (14.0)	39 (68.4)	8 (14.0)	
No	29 (6.5)	116 (26.2)	233 (52.6)	65 (14.7)	0.107

P-value was determined using chi-square test

The logistic regression model demonstrated that risk of suffering from moderate to severe anemia increases among elderly participants. Participants aged between 61-70 years had 3 times higher risk of

moderate to severe anemia (aOR 3.36, 95% CI 1.13-9.93), while those aged between 71-80 years had a 6.5 times higher risk (aOR 6.59, 95% CI 1.78-24.43), and those aged more than 80 years had almost 8 times higher risk (aOR 7.83, 95% CI 1.52-40.19). Similarly, female participants were at 4.6 times higher risk of suffering from moderate to severe anemia compared to male participants (aOR 4.65, 95% CI 2.93-7.37). However, history of having comorbidities and chronic NSAID use were not revealed as significant risk factors of high grade anemia (Table 3).

Table 3: Risk factors of moderate to severe anemia among the participants (logistic regression model)

Characteristics	aOR (95% CI)	p-value
Age (years)		
13-17	Ref.	
18-30	1.96 (0.69-5.59)	0.205
31-40	2.84 (0.96-8.39)	0.058
41-50	2.45 (0.84-7.18)	0.101
51-60	2.40 (0.82-7.02)	0.110
61-70	3.36 (1.13-9.93)	0.028
71-80	6.59 (1.78-24.43)	0.005
>80	7.83 (1.52-40.19)	0.014
Sex		
Male	Ref.	
Female	4.65 (2.93-7.37)	<0.001
History of comorbidities		
No	Ref.	
Yes	1.02 (0.63-1.65)	0.938
History of chronic NSAID use		
No	Ref.	
Yes	1.71 (0.78-3.70)	0.175

aOR = adjusted odd's ratio

Discussion

The present study provides an insight into the hemoglobin status, and prevalence of anemia among the hospital admitted patients of the Meherpur district. The National Micronutrients Status Survey conducted during 2011-12 reported that the mean Hb concentration was 12.4 g/dL (95% CI 12.3-12.6 g/dL) among the non-pregnant women and 11.5 g/dL (95% CI 11.3-11.7 g/dL) for preschool children of Bangladesh (10). Among the participants of our study, the mean (SD) of the Hb level was 9.8 (1.7) g/dL with significantly lower Hb level in females (mean 10.1, SD 1.8 among males and mean 9.5, SD 1.5among females), which is relatively lower compared to the national report. Though there is a lack of nationally representative studies on the prevalence of anemia, the Demographic and Health Survey (BDHS) conducted in 2011 reported that 42% of the women of reproductive age were anemic

(primarily mild to moderate anemia).[6] On the contrary, our data revealed that a total of 94% of participants were suffering from some sort of anemia, which is much higher compared to the BDHS report (mild 25%, moderate 54%, and severe 15%). In addition, the prevalence of anemia was significantly higher among the female participants (96%) compared to male participants (91%).

According to the finding of our study, the risk of anemia increases with age, and elderly patients aged more than 80 years are at the highest risk. This finding is similar to a study that reported a significantly lower level of Hb concentration among the elderly population of Bangladesh.[11] Anemia is expected in the elderly worldwide, and its prevalence increases with age, with the highest prevalence in men 85 years and older.[12] Though we could not find out the cause of anemia in our study, it was reported that the most common causes of anemia in the elderly are chronic disease and iron deficiency.[12] In addition, different studies conducted mostly among reproductive women of Bangladesh reported that lower educational qualification, lower socioeconomic status, having multiple children, and poor nutritional status (low BMI) were significant predictors of anemia in this country. [13–15]

. Different clinical trials evidenced that long-term use of NSAIDs has been associated with clinically significant decreases in hemoglobin concentration (>2 g/dL) and independent of acute bleeding events (16–19). However, in our study, patients with a history of chronic NSAID use had a slightly higher prevalence of anemia than their counterparts (96.5% vs. 93.5%) though it was not statistically significant (OR 1.71, 95% CI 0.78-3.70, p-value 0.175). Some limitations of the study would be worth mentioning. As the study included only admitted patients of a district hospital, the result cannot be generalized for the overall population of Bangladesh. Moreover, detailed socio-demographic data of the patients was not taken in our study, so evaluation of the risk factors of anemia was not possible. Despite these limitations, the study provides an overall picture of the hemoglobin status and prevalence of anemia among hospital-admitted patients of the Meherpur district.

Conclusion

Our study demonstrated that the Hb level was quite low among the patients admitted in Meherpur district hospital. Moreover, prevalence of anemia was quite high among these patients, especially among female and elderly patients. So, routine assessment and proper management of anemia of the hospital admitted patients with different diagnoses is crucial for better treatment outcome.

References

1. Chaparro CM, Suchdev PS. Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. Vol. 1450, Annals of the New York Academy of Sciences. Blackwell Publishing Inc.; 2019. p. 15–31.

2. Gardner W, Kassebaum N. Global, Regional, and National Prevalence of Anemia and Its Causes in 204 Countries and Territories, 1990–2019. Curr Dev Nutr. 2020 Jun 1 [cited 2021 Apr 7];4(Supplement_2):830–830.

3. World Health Organization. (2008). Worldwide prevalence of ana1993-2005 :WHO global database on anaemia / .Edited by Bruno de Benoist ,Erin McLean ,Ines Egli and Mary Cogswell. World Health Organization. https://apps.who.int/iris/handle/10665/43894

4. WHO | Global anaemia prevalence and number of individuals affected. WHO. 2008;

5. Population, total - Bangladesh | Data [Internet]. [cited 2021 Apr 24]. Available from: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=BD

6. Bangladesh demographic and health survey 2011 National Institute of Population Research and Training Dhaka, Bangladesh. 2013

7. Ahmed F. Anaemia in Bangladesh: A review of prevalence and aetiology. Public Health Nutr. 2000;3(4):385–93.

8. Rahman MA, Rahman MS, Aziz Rahman M, Szymlek-Gay EA, Uddin R, Islam SMS. Prevalence of and factors associated with anaemia in women of reproductive age in Bangladesh, Maldives and Nepal: Evidence from nationally-representative survey data. Gopichandran V, editor. PLoS One. 2021;16(1):e0245335.

9. National Micronutrients Status Survey 2011-12 Final Report icddr,b UNICEF, Bangladesh GAIN Institute of Public Health and Nutrition. 2013.

10. Kumar Das S, Syed Golam Faruque A, Ahmed S, Al Mamun A, Raqib R, Kumar Roy A, et al. Nutritional and Micronutrient Status of Elderly People Living in a Rural Community of Bangladesh. J GerontolGeriat Res. 2012;2012(3).

11. Smith DL. Anemia in the Elderly. Am Fam Physician. 2000 Oct 1;62(7):1565–72.

12. Kamruzzaman M, Rabbani MG, Saw A, Sayem MA, Hossain MG. Differentials in the prevalence of anemia among non-pregnant, ever-married women in Bangladesh: Multilevel logistic regression analysis of data from the 2011 Bangladesh Demographic and Health Survey. BMC Womens Health. 2015;15(1).

13. Mistry SK, Jhohura FT, Khanam F, Akter F, Khan S, Yunus FM, et al. An outline of anemia among adolescent girls in Bangladesh: Findings from a cross-sectional study. BMC Hematol. 2017, 17(13).

14. Rahman MS, Mushfiquee M, Masud MS, Howlader T. Association between malnutrition and anemia in under-five children and women of reproductive age: Evidence from Bangladesh demographic and Health Survey 2011. PLoS One. 2019;14(7).

15. Goldstein JL, Chan FKL, Lanas A, Wilcox CM, Peura D, Sands GH, et al. Haemoglobin decreases in NSAID users over time: An analysis of two large outcome trials. Aliment PharmacolTher. 2011;34(7):808–16.

16. Silverstein FE, Faich G, Goldstein JL, Simon LS, Pincus T, Whelton A, et al. Gastrointestinal toxicity with Celecoxib vs nonsteroidal anti-inflammatory drugs for osteoarthritis and reumatoid arthritis: The CLASS study: A randomized controlled trial. J Am Med Assoc. 2000 Sep 1;284(10):1247–55.

17. Chan FKL, Lanas A, Scheiman J, Berger MF, Nguyen H, Goldstein JL. Celecoxib versus omeprazole and diclofenac in patients with osteoarthritis and rheumatoid arthritis (CONDOR): A randomised trial. Lancet 2010;376(9736):173–9.

18. Chan FKL, Cryer B, Goldstein JL, Lanas A, Peura DA, Scheiman JM, et al. A novel composite endpoint to evaluate the gastrointestinal (GI) effects of nonsteroidal antiinflammatory drugs through the entire GI tract. J Rheumatol. 2010;37(1):167–74

All Correspondence to
Dr. Asish Kumar Debnath
Senior Consultant, Medicine
General Hospital, Meherpur
Email: asishkdebnath1997@gmail.com