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Original Research Article.

Anemia and Iron Deficiency among Children and Their Association with Feeding Status That's Effects on Weight and Height in the Southern Part of Bangladesh

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ABSTRACT

Background: Anemia is the disorder in which the concentration of hemoglobin in the blood is lower than the levels considered normal for a person's age and gender.
Objective: In this study our main goal is to assess the relationship among anemia, iron deficiency and feeding status in weight and height in children southern part of Bangladesh.
Method: This cross sectional study was carried out from January 2016 to January 2018 at secondary care hospital among 322 hospitalized children and after examination children's divided into two group: one is anemic (191) and another is non-anemic (131).
Results: In the study majority of the infants belongs to 6 to 12 month age group and 64% of patients had microcytic hypochromic anemia. Also premature birth and low birth weight were found to be expressively associated with occurrence of anemia.
Conclusion: From this study we can conclude that prematurity, low birth weight and poor complementary feeding practices is responsible anemia and iron deficiency among children in southern part of Bangladesh. Raising awareness, providing effective health and nutrition education in general will be the key solutions to prevent and control this public health problem in Bangladesh.

Keywords: Anemia, Hemoglobin, Iron Deficiency.

INTRODUCTION

Anemia is the major public health issue in pregnancy worldwide. WHO assessments that more than half of pregnant women in the world have hemoglobin level indicative of anemia (<11.0 gm/dl). The prevalence of anemia may however as high as 56% or 61% in developing countries. Cases of anemia still high in pregnant women have low consciousness about the importance of anemia prevention and the danger of less iron supplement. Pregnant women are mostly suffering from anemia in our country Bangladesh. This is the demand for iron and other vitamins increased due to physiological burden of pregnancy. Folate deficiency is a minor component contributing to anemia. Which may be marked by co-existing iron deficiency. Vitamin B12 deficiency & thalassemia major are usually associated with infertility. Detorious effects occur in mother as well as baby as a result of anemia, which is multifactorial as a community like ours. Multiparity, poor socio-economical, educational status & lack knowledge are the principal reasons for a high prevalence of anemia in our population. Microcytic hypochromic anemia resulting from iron deficiency is the most frequent from anemia (76%), followed by folate deficiency (20%) and combined folate and iron deficiency 20%.[1-3]

Current knowledge indicates that iron deficiency anemia in pregnancy is a risk factor for preterm delivery and subsequent low birth weight. It has been noted that infants breasted for more than 6months without receiving iron fortified complementary foods or iron supplemental on are at risk of developing iron deficiency anemia (IDA).[4,5] Other risk factors for anemia comprise low birth weight, unusual perinatal hemorrhage, prolonged consumption of

large amounts of cow's milk, and intestinal infection, such as hookworms and diarrhea.[6] Also, anemia harms normal growth and progress, decreases physical exercise tolerance and intellectual performance in children.[7] In this study our main goal is to estimate the relationship among anemia, iron deficiency and feeding status in weight and height in children.
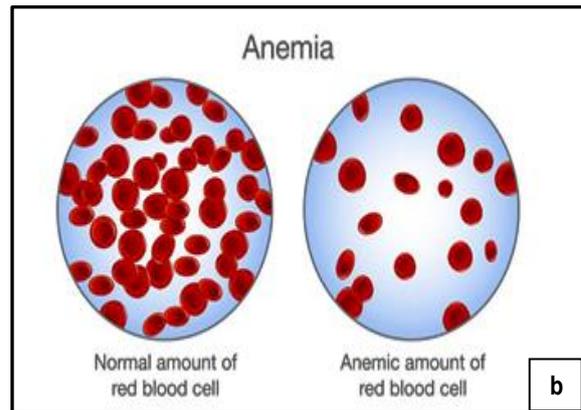
Figure-1a and1b: Anemic infants after birth and red blood cell presence in their blood

OBJECTIVE
General Objective
- To estimate the relationship among anemia, iron deficiency and feeding status in weight and height in children.

Specific Objective
- To detect types of anemia of the patients
- To evaluate birth history of the patients

METHODOLOGY
Study Type
This was cross sectional study.

Study Place and Period
This cross sectional study was done at Sadar Hospital, Satkhira (A Clinical teaching hospital of Satkhira Medical College, special department of pediatrics) from March 2015 to march 2017 among 100 neonates.

Method
In the study 322 Children aged < 6 to ≥ 6-12months, who were admitted during this period due to any acute illness like acute respiratory tract infection, acute gastroenteritis and whose parent or guardian provided informed consent, were eligible for enrolment. After enrolment a detailed case history was taken and physical examination was performed.

All patients' data were recorded on standard case record forms. Historical information included socioeconomic status birth history (prematurity, low birth weight) and detailed feeding practice since birth was recorded.

Complete blood count (CBC) including peripheral blood smear was done in all study population. A 2 ml blood sample was collected by venipuncture into an EDTA coated tube. For hemoglobin (Hb) measurement, erythrocyte count and mean red cell volume the coulter counter machine was used. The mean corpuscular volume (MCV) was derived from these values. Anemia was defined when Hb level was below <11 g/dL according to World Health Organization (WHO). Anemia was labeled as mild (Hb 10-10.9gm/dl), moderate (Hb 7-9.9gm/dl), and severe (Hb<7 gm/dl).Children were categorized as children with anemia (Hb<11gm/dl) and children without anemia (Hb≥11gm/dl). After examination children's divided into two group: one is anemic (191) and another is non-anemic (131).

Data Analysis
The data were entered and analyzed using SPSS version 22.0 for Windows (SPSS Inc, Chicago, IL, USA) software. Standard test for significance using Chi-square ($\chi 2$) test and multivariate predictor analysis were performed. P-value of <0.05 was considered as statistical significant.

Table 1: Distribution of the study patients according to socioeconomic status

Description	Socioeconomic Status		
	Poor,%	Middle,%	Upper,%
Anemia	76%	53%	49%
Non anemia	24%	47%	51%

Table 2: Demographic characteristics of patient's parents

| Variable	%
Education status of patients mother:	
Secondary and above	14%
Primary or less	15%
Illiterate	71%
Education status of patients father:	
Secondary and above	45%
Primary or less	33%
Illiterate	22%
Occupation status of patients mother:	
Housewife	80%
Working mother	20%
Occupation status patients father:	
Labour-intensive job	40%
Moderate-activity job	35%
Sedentary activity job	25%
Parity:	
Primigravida	52.02%
2nd pregnancy	28.28%
Multiple gravida	19.70%
Knowledge about anemia:	
Yes	52%
No	48%
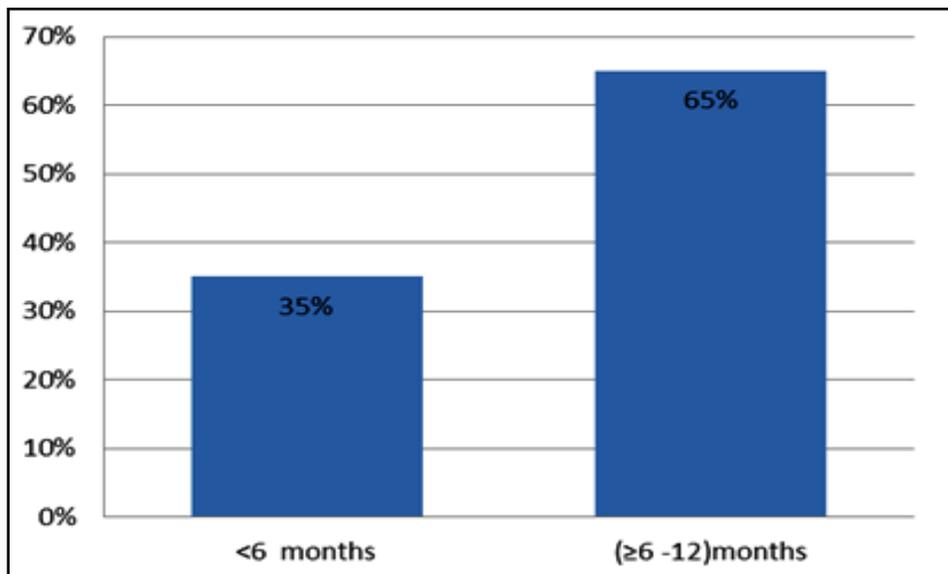
Figure-2: Age distributions of the infants.
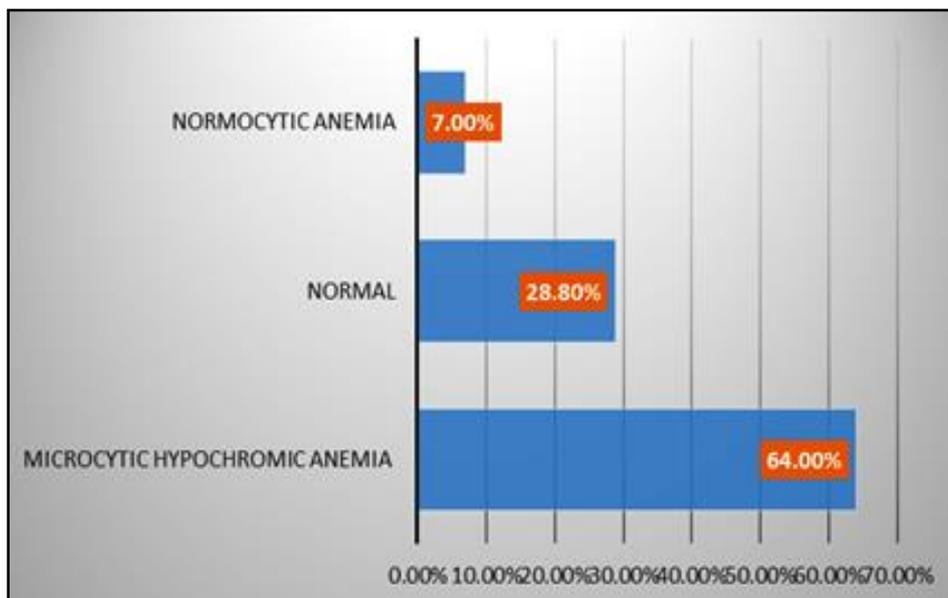
Figure-3: Types of anemia.
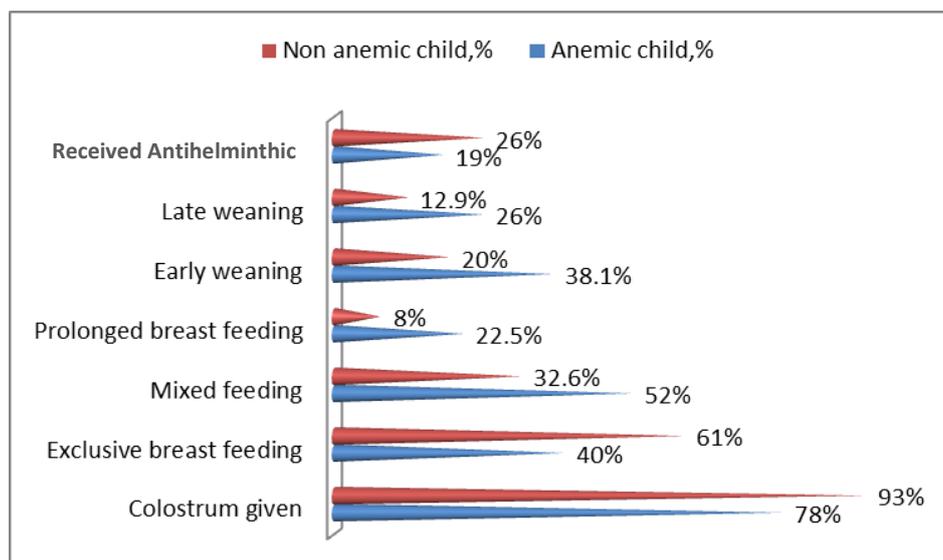
Figure 4: Distribution of the Study Patients according to Feeding History

Table 3: Distribution of the study patients according to birth history

Variable	Children with anemia	Children without anemia
	%	%
Premature birth:		
Present	15%	1.5%
Absent	85%	98.5%
Low birth weight:		
Present	11%	2%
Absent	89%	98%

RESULTS

In figure-2 shows age distributions of the infants where majority of the infants belongs to 6 to 12 month age group.

In table-1 shows distribution of the Study patients according to socioeconomic Status where in anemia group most of the patients socioeconomic status was poor 75% whereas for non-anemic group most of them were in upper socioeconomic.

In table-2 shows demographic characteristics of patients parents where most of the patient's mother were illiterate and house wife.

In figure-3 shows types of anemia of the patients where 64% of patients had microcytic hypochromic anemia followed by 28.8% had normal findings and 7% had normocytic anemia. Table 2 shows distribution of the study patients according to birth history where premature birth and low birth weight were found to be expressively associated with occurrence of anemia.

In figure-4 shows distribution of the Study Patients according to feeding history where poor feeding practices like colostrum rejection, non-exclusive breast feeding, early/late weaning and inappropriate weaning diet are important risk factors for childhood anemia.

In table-3 shows multivariate analysis of risk factors of anemia among anemic children where colostrum rejection, late weaning, Low birth weight, these factors were significant contributors to the occurrence of anemia.

In table-4 shows distribution of mean levels of hemoglobin according to infant age, weight and height where mean hemoglobin levels differed significantly according to different variable. Hemoglobin levels compatible with anemia (<11.0 g/dl) were detected in children, with greater occurrence among children six months or older.

In table-5 shows mean distribution of hemoglobin levels among infants according to feeding pattern where highest hemoglobin concentrations were observed among exclusively breastfed children, followed by those predominantly breastfed.

Table 4: Multivariate analysis of risk factors of anemia among anemic children

Risk Factors	Adjusted OR	95% CI		P value
		lower	upper	
Low birth weight/prematurity	5.30	1.45	19.50	0.013
Prolonged breast feeding	3.50	1.61	7.8	0.003
Early weaning	2.49	1.19	5.1	0.001*
Socioeconomic status (poor)	1.75	1.10	2.90	0.031*
Colostrum feeding	0.44	0.21	1.10	0.072
Exclusive breast feeding	1.51	0.56	4.05	0.452
Late weaning	1.43	0.55	3.89	0.487

Table 5: Distribution of mean levels of hemoglobin according to infant age, weight and height

Variables	N	Mean (g/dl)	S D	p
Age (months)				<0.001
< 6	374	10.93	0.101	
≥ 6-12	179	10.07	0.145	
Weight-for-age (Waz*)				0.002
<-2 SD	17	9.20	0.476	
≥-2 SD	520.	10.68	0.086	
Height-for-age (Haz)**				0.097
<-2 SD	34	10.10	0.034	
≥-2 SD	491	10.69	0.090	

Source by: http://www.scielo.br/pdf/rsp/v38n4/en_21084.pdf[7]

Table-6: Mean distribution of hemoglobin levels among infants according to feeding pattern

Feeding pattern	N	Mean hemoglobin levels (g/dl	SD
Exclusive breastfeeding	37	11.83	0.208
Predominant breastfeeding	39	11.17	0.221
Complemented breastfeeding	26	10.37*	0.24
Mixed milk feeding	28	10.95	*0.261
Complemented mixed milk feeding	37	10.27	*0.164
Artificial milk feeding	14	10.31	*0.40

Source by: http://www.scielo.br/pdf/rsp/v38n4/en_21084.pdf[7]

DISCUSSION

Anemia badly affects immunity, growth, and cognitive progress, which upsets school performance and social development. The occurrence of anemia differs widely between the countries. Different surveys in the previous have shown that anemia is a severe issue in Bangladesh among all ages, population and geographic groups.[8,9]

In this study, we found that majority of the infants belongs to 6 to 12 month age group. National Surveillance Project (NSP) of Helen Keller International (HKI) in collaboration with the Institute of Public Health Nutrition (IPHN) which showed that overall 68% of Bangladeshi children aged (6-59) months had anemia.[10] The occurrence of anemia in the neighboring country of India was 74.3% for 6-35months age group, Nepal had 78% for 6-59 months age group and in Kazakhstan anemia incidence was found to be at 73.7% for 0-23 months age group.[7] All these study was quite similar to our study. In this study, among the anemic cases, the incident of microcytic anemia was high than other types of anemia. Which is supported by other studies?[7,8]

The incidence of IDA among the anemic babies has been shown to be higher in other developing countries, such as South Benin, Africa (62%), Argentina (46%) and Pakistan (67%).

The high occurrence of iron deficiency could be attributed to the high frequency of nutritional inadequacy, intestinal parasite infestation, and the high consumption of pasteurized unfortified cow's milk in these regions. In the study we also found that feeding with cow's milk (artificial milk feeding) was the feeding pattern related with the greatest decrease in hemoglobin levels in infants. This is supported by one study.[11]

According to the World Health Organization, the most common cause of high occurrence of anemia (above 40%) is the lack of dietary iron, which is related to the low ingesting of micronutrient and/or to the high ingestion of inhibitors of iron absorption.[12] The prevalence of iron deficiency, however, is much lower in developed countries. The lower prevalence of ID in these developed countries is attributed to several factors: improved socio-economic status, avoidance of cow's milk feeding during the first year of life, and improvement in the childhood iron nutrition after implementation of special supplemental food programmers for women, infants and children.[7] This study also noted that anemia was more common in the low socio-economic class, among whom the adverse consequences of anemia on health, nutrition and livelihoods are most serious. In this study majority of the anemic children belongs to poor and lower middle class family while only small percentage infants came from upper middle class family. In Bangladesh, prematurity, low birth weight and poor complementary feeding practices were responsible for anemia. In this study, anemia was found to be suggestively related with low birth weight, height and prematurity. Healthy normal weight newborns classically have adequate iron stores up to six months of life, provided they are exclusively breasted.

CONCLUSION

From this study we can conclude that prematurity, low birth weight and poor complementary feeding practices is responsible for anemia and iron deficiency among children in southern part of Bangladesh. Raising awareness, providing effective health and nutrition education in general will be the key solutions to prevent and control this public health problem in Bangladesh.

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