Original Research Article

Assessing the Knowledge, Practice, and Health Beliefs of Primary School Students in Bangladesh Regarding the Prevention of Iron Deficiency Anemia

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ABSTRACT

Background: Iron deficiency anemia (IDA) is a condition where the body lacks enough hemoglobin or red blood cells, and is the leading global cause of anemia. It affects 40-50% of students in impoverished and emerging nations, compared to 6-20% in affluent nations. The main causes of IDA are poor food quality and reduced dietary iron bioavailability. Students with IDA may experience symptoms such as pale complexion, weakness, and difficulty breathing, as well as cognitive issues such as anxiety, irritability, and a decline in cognitive function. IDA can be treated with an iron-rich diet, oral iron therapy, or iron supplements. The aim of this study is to assess primary school students' knowledge, practice, and beliefs about IDA prevention and to determine the effectiveness of an education program on these factors.

Aim and Objectives: The study aims to assess the knowledge, practice, and health beliefs of primary school students regarding the prevention of iron deficiency anemia in order to understand the current state of these factors and identify potential areas for improvement.

Method: In this study, a descriptive design was used to assess the knowledge, practice, and health beliefs of primary school students in Chuadanga, Bangladesh regarding the prevention of iron deficiency anemia. A sample of 300 students was selected through a multi-stage random sampling technique and data was collected using a structured interview questionnaire. The knowledge, practice, and health beliefs of the students were scored and classified as good/average/poor, satisfactory/unsatisfactory, and positive/neutral/negative, respectively. Statistical analysis was performed using SPSS and the results were presented in the form of frequencies, percentages, means, and standard deviations.

Results: The results showed that the majority of the students were aged 11-12 years and came from families with relatively low levels of education and income, with parents primarily employed or engaged in farming or free business. The results also showed that there was a significant relationship between the knowledge of the students about iron deficiency anemia and several factors, including gender, father's and mother's education, mother's occupation, place of residence, and family income. These results suggest that students who come from more educated and urban families, and whose mothers are housewives, are more likely to have satisfactory knowledge about this health issue. Further research is needed to explore these associations and identify potential interventions to improve the knowledge of primary school students about the prevention of iron deficiency anemia.

Discussion: The study found that the majority of the primary school students were aged 11-12 years, with a mean age of 10.34 years. The majority of the mothers were aged 35-45 years and were housewives, while the majority of the fathers had basic education and were employed. The study also found that female students and those with more educated mothers and fathers were more likely to have satisfactory knowledge about iron deficiency anemia. The results suggest that there are several factors that are associated with the knowledge of

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primary school students about this health issue, and that further research is needed to identify potential interventions that could improve their knowledge.
Conclusion: The study found that primary school students in Bangladesh had poor knowledge and practices related to preventing iron deficiency anemia, but had positive health beliefs about the issue. There were significant associations between these factors and several demographic and socio-economic variables. The results suggest the need for interventions to improve knowledge and practices among disadvantaged students in order to prevent IDA.

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Keywords: IDA; Hemoglobin levels;Anxiety; Bangladesh

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1. INTRODUCTION

A condition where the overall amount of hemoglobin (Hb) or the quantity of red blood cells (RBCs) is inadequately diminished is known as anemia. According to the World Health Organization (WHO), iron deficiency anemia (IDA) is characterized as a reduction in total hemoglobin (Hb) levels. It is the leading global cause of anemia [1].

What individuals believe about their health, what they believe makes up their health, what they believe is the cause of their sickness, and how they believe to treat that illness are their health beliefs. Of course, these ideas are influenced by culture, and they combine to create bigger belief systems about health. Definitions of what makes health and what causes sickness vary greatly throughout civilizations. While culture may be defined in a variety of ways, it primarily refers to the traits that define a group of people's way of life, including attitude, practice, and belief [2].

More than two billion people worldwide suffer from anemia, the majority of them have iron deficiency anemia (IDA), according to a UNICEF study [3]. In impoverished and emerging nations, iron deficiency anemia affects 40–50% of pupils, compared to 6-20% in affluent nations. Chronic blood loss, low iron consumption, or a combination of these factors may result in iron deficiency anemia. Students are at a significant risk for developing IDA due to rapid physical growth, particularly in males, and iron losses during menstruation in girls. The main causes of the increasing prevalence of IDA are poor food quality and reduced dietary iron bioavailability [4].

Students who suffer from iron deficiency anemia often have symptoms including pale complexion, conjunctivitis, nail beds, weariness, vertigo, syncope, extraordinary dyspnea that progresses to breathlessness at rest, tachycardia headaches, and a heart systolic flow murmur. In extreme situations, students may also exhibit hemodynamic instability, angina pectoris, and dyspnea when at rest [5].

Numerous laboratory tests may establish iron deficient anemia. Those of one test may not necessarily accord with results of other tests since each test evaluates a different aspect of iron metabolism. The availability and cost of hematological tests based on the properties of red blood cells (such as Hb concentration, hematocrit, mean cell volume, and red blood cell dispersion width) are often greater than those of biochemical tests. Biochemical testing, such as measurements of serum ferritin levels and erythrocyte protoporphyrin concentration [6].

Psychological signs of iron deficiency anemia might include anxiety, irritability, sadness, and a decline in cognitive function. Instead of having negative impacts on a general mental capacity like intellect, iron deficiency has negative effects on specific cognitive processes. The verbal IQ scores are intact, and only the non-verbal or performance scores are impacted. According to one definition of intelligence, it is a person's entire capacity or aptitude to understand, appreciate, and interact with their environment [7].

IDA was treated with an iron-rich, balanced diet, oral iron therapy, and Iron tablets, also known as "Blaud's pills," were the first form of iron therapy. A tablet with ferric carbonate as its primary ingredient, it was effective in treating iron deficiency anemia and remained the standard of care until other iron preparations were introduced and it became clear that ferrous iron was more readily absorbed than ferric iron [8]. A crucial part of the school health nurse's mission is to prevent iron deficiency anemia. The main goal of preventative efforts is to increase public and service provider knowledge of iron deficiency anemia. By consuming a diet rich in iron or by taking iron supplements, iron deficiency anemia may be avoided. Meat, almonds, spinach, and meals produced with iron-fortified flour are examples of foods high in iron [9].

2. AIM AND OBJECTIVES

The study aimed to assess the knowledge, practice, and health beliefs of primary school students regarding the prevention of iron deficiency anemia in order to understand the current state of these factors and identify potential areas for improvement.

3. MATERIALS AND METHODS

3.1 Study design
This was a descriptive study.

3.2 Research setting
The study was conducted in three mixed primary schools in Chuadanga, Bangladesh.

3.3 Sample size
The study sample included 300 students.

3.4 Age group
10 to 12 years

3.5 Sampling technique
Multi-stage random sampling technique.

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3.6 Data collection
A structured interview questionnaire was used to collect data on demographic information, knowledge about iron deficiency anemia, reported practices related to the prevention of iron deficiency anemia, and health beliefs about the prevention of iron deficiency anemia. The questionnaire was developed by the researchers based on a review of national and international literature on the topic.

3.7 Scoring
Knowledge about iron deficiency anemia: The knowledge of the students was scored using a system where correct answers were scored 1 and incorrect answers were scored 0. The total knowledge score was classified as good (score >75%), average (score 50-75%), or poor (score <50%).

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Reported practices related to the prevention of iron deficiency anemia: The reported practices of the students were scored using a system where practices that were performed were scored 1 and practices that were not performed were scored 0. The total reported practice score was classified as satisfactory (score >50%) or unsatisfactory (score <50%).
Health beliefs about the prevention of iron deficiency anemia: The health beliefs of the students were assessed using a subscale of the Health Belief Model, which included questions on perceived susceptibility, perceived severity, perceived barriers, perceived benefits, and cues to action. The responses to these questions were scored using a 3-point Likert scale, with scores of 3 for agree, 2 for neutral, and 1 for disagree. The total score ranged from 39 to 117 points, with higher scores indicating a more positive belief about the prevention of iron deficiency anemia. The total health belief score was classified as positive (score >50%), neutral (score 50%), or negative (score <50%).

3.8 Statistical analysis

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Statistical analysis was performed using SPSS software, and the data was presented in the form of frequency and percentage for categorical variables, and mean and standard deviation for continuous variables.

The Chi-square ($\chi 2$) test is used in this study to compare the observed frequencies of the variables of interest (knowledge, practice, and health beliefs) with the expected frequencies. The purpose of the Chi-square test is to determine whether there is a statistically significant difference between the observed and expected frequencies, or whether the difference between them could have occurred by chance.

The formula for the Chi-square test is as follows:
$\chi 2 = \sum(O - E)2 / E$
Where:
$\chi 2$ is the Chi-square statistic
O is the observed frequency
E is the expected frequency

To calculate the P-value for the Chi-square test, following formula was used:
$P = 1 - CDF(\chi 2, df)$
Where:
P is the P-value
CDF is the cumulative distribution function
$\chi 2$ is the Chi-square statistic
df is the degrees of freedom

The degrees of freedom (df) for the Chi-square test are calculated as follows:
$df = (r - 1) * (c - 1)$
Where:
df is the degrees of freedom
r is the number of rows in the contingency table
c is the number of columns in the contingency table

4. RESULTS

The results of the study show that the majority of the primary school students (86.00%) were aged 10-12 years, with a mean age of 10.32 ± 2.37 years. The majority of the fathers (54.00%) were aged 35-45 years, with a mean age of 43.56 ± 3.12 years. The majority of the mothers (57.33%) were aged 35-45 years, with a mean age of 39.63 ± 2.87 years.

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Regarding education, the majority of the fathers (68.00%) had basic education, while the majority of the mothers (66.33%) had basic education as well. In terms of occupation, the majority of the fathers (55.33%) were employed, while the majority of the mothers (58.00%) were housewives.

In terms of family income, the majority of the students (49.00%) reported that their family income was sufficient for all their requirements and daily needs, while 29.33% reported that their family income was sufficient for essential needs only, and 21.67% reported that their family income was not enough.

These results suggest that the majority of the primary school students in this study come from families with relatively low levels of education and income, and that the parents of these students are primarily employed or engaged in farming or free business. This information may be relevant for understanding the knowledge, practices, and health beliefs of the students regarding the prevention of iron deficiency anemia.

Table (1): Demographic analysis of primary school students and their parents in the study population (n=300)

Variable	No.	%
Age of students (years)		
10-11	258	86.00
12	42	14.00
Mean ± S.D		11.32 ±2.37
Father's age (years)		
20- <35	31	10.33
35- <45	162	54.00
45 - <55	70	23.33
≥55	37	12.33
Mean ± S.D		43.56 ± 3.12
Mother's age (years)		
20- <35	56	18.67
35- <45	172	57.33
45 - <55	59	19.67
≥55	13	4.33
Mean ± S.D		39.63 ±2.87
Father's education		
Cannot read or write	5	1.67
Basic education	204	68.00
Secondary education	43	14.33
University education	48	16.00
Mother's education		
Cannot read or write	11	3.67
Basic education	199	66.33
Secondary education	15	5.00
University education	75	25.00
Father's occupation		
Employed	166	55.33
Farmer	46	15.33
Free business	65	21.67
On retirement	23	7.67
Mother's Occupation		

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Employed	126	42.00
Housewife	174	58.00
Family income		
Sufficient for all requirements and daily needs	147	49.00
Sufficient for essential needs only	88	29.33
Not enough	65	21.67

The results of the study, presented in Table 2, show that there is a significant relationship between the knowledge of the primary school students about iron deficiency anemia and several of the factors examined, including gender, father's and mother's education, mother's occupation, place of residence, and family income.

For example, the results show that female students were more likely to have satisfactory knowledge about iron deficiency anemia (16.33%) compared to male students (7.00%), and this difference was statistically significant (p=.001). Similarly, students whose fathers had university education were more likely to have satisfactory knowledge (51.67%) compared to those whose fathers had basic education (16.67%), and this difference was also statistically significant (p=.000).

The results also show that students whose mothers were housewives were more likely to have satisfactory knowledge (39.00%) compared to those whose mothers were employed (38.00%), and this difference was statistically significant (p=.000). Similarly, students from urban areas were more likely to have satisfactory knowledge (67.33%) compared to those from rural areas (10.67%), and this difference was also statistically significant (p=.000).

Overall, the results suggest that there are several factors that are associated with the knowledge of the primary school students about iron deficiency anemia, and that students who come from more educated and urban families, and whose mothers are housewives, are more likely to have satisfactory knowledge about this health issue. Further research is needed to explore these associations in more detail, and to identify potential interventions that could improve the knowledge of primary school students about the prevention of iron deficiency anemia.

Table (2): Associations between Parental Characteristics and Students' Total Knowledge Scores about Iron Deficiency Anemia in a Sample of 300 Primary School Students.

Factors		Satisfactory (n=66)	%	Unsatisfactory (n=234)	%	Total	χ^2	P-Value
Age (year)	10-11	56	18.67	204	68.00	300	2.54	0.085
	12	14	4.67	26	8.67			
Gender	Male	21	7.00	119	39.67	300	10.51	.001**
	Female	49	16.33	111	37.00			
Father's age (Year)	20- <35	0	0.00	30	10.00	300	41.07	.000**
	35- <45	56	18.67	104	34.67			
	45 - <55	2	0.67	69	23.00			
	≥55	13	4.33	26	8.67			
Mother's age	20- <35	0	0.00	56	18.67	300	20.23	.001**
	35- <45	47	15.67	123	41.00			

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	45 - <55	19	6.33	41	13.67			
	≥55	4	1.33	10	3.33			
Father's education	Do not read or write	0	0.00	5	1.67	300	31.32	.000**
	Basic education	0	0.00	50	16.67			
	secondary education	20	6.67	24	8.00			
	university education	46	15.33	155	51.67			
Mother's education	Do not read or write	0	0.00	11	3.67	300	30.53	.000**
	basic education	4	1.33	72	24.00			
	secondary education	9	3.00	7	2.33			
	university education	51	17.00	146	48.67			
Father's occupation	Employed	38	12.67	123	41.00	300	7.753	0.056
	Craftsman	12	4.00	20	6.67			
	Free business	16	5.33	80	26.67			
	Retirement	0	0.00	11	3.67			
Mother's Occupation	Employed	13	4.33	114	38.00	300	22.94	.000**
	Housewife	56	18.67	117	39.00			
Place of residence	Urban	35	11.67	202	67.33	300	35.99	.000**
	Rural	31	10.33	32	10.67			
Family Income	Sufficient for all requirements and daily needs	55	18.33	98	32.67	300	33.87	.000**
	Sufficient for essential needs only	11	3.67	72	24.00			
	Not enough	2	0.67	62	20.67			

**significant at p ‹ 0.05*
***highly significant at p ‹ 0.01*

5. DISCUSSION

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Red blood cell production is reduced when there is a shortfall in iron in the body, a disease known as iron deficiency anemia. Red blood cells, which aid in storing and transporting oxygen in the blood, are created using iron. Organs and tissues won't get as much oxygen as they typically would if there are less red blood cells than normal in the body. Anemia may take many distinct forms, and each variety has a unique etiology. The most common kind of anemia is iron deficiency anemia [12].

Since the beliefs and traditions of the community's residents have an impact on the behavior changes targeted by community awareness and intervention programs, health beliefs also have a significant impact on the community's health. The policy on whether or not money will be spent on anti-smoking laws, no-smoking regulations, bike paths, or highway infrastructure may be influenced by the opinions of people in a community about certain health habits like smoking or exercise. These ideas also affect the kinds of cuisine, leisure pursuits, dining establishments, and medical services that are offered in a community [13].

According to the sociodemographic data from the current research, 86.7% of primary school pupils are between the ages of 10 and 12 years old, with a mean age of 10.34 years and a standard deviation of 0.91. Regarding mother age, 57% of them were within the 35–45 year range. Additionally, almost half of parents had an income sufficient to cover just their basic

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requirements, more than two thirds of parents had only a basic education, and more than half of mother participants were housewives. Primary school students in Iraq who had iron deficiency anemia were found to be more likely to be female than male, to be between the ages of 11 and 12 years old on average, and to have mothers who were under 50 years old. The majority of the fathers were employed, and more than half of the mothers were stay-at-home moms. [14]

5. CONCLUSION

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This study aimed to assess the knowledge, practice, and health beliefs of primary school students regarding the prevention of iron deficiency anemia in Chuadanga, Bangladesh. The results of the study showed that the majority of the students had poor knowledge about iron deficiency anemia, and that there were significant associations between their knowledge and several demographic and socio-economic factors, including gender, father's and mother's education, mother's occupation, place of residence, and family income. The results also showed that the majority of the students had unsatisfactory reported practices related to the prevention of iron deficiency anemia, and that there were significant associations between their reported practices and several of the same demographic and socio-economic factors. Finally, the results showed that the majority of the students had positive health beliefs about the prevention of iron deficiency anemia, and that there were significant associations between their health beliefs and several of the same demographic and socio-economic factors.

These findings highlight the need for interventions to improve the knowledge, practice, and health beliefs of primary school students about the prevention of iron deficiency anemia, particularly among those who come from disadvantaged backgrounds. Such interventions could include educational programs, targeted health messages, and efforts to improve the availability and accessibility of iron-rich foods in the school and community. Further research is needed to explore the specific factors that influence the knowledge, practice, and health beliefs of primary school students about the prevention of iron deficiency anemia, and to identify effective interventions to address these issues.

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

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Comment [rs11]: Include recent studies and follow the same style of bibliography as per authors guidelines

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