

Prevalence of Anemia and Associated Factors in Jashore District of Bangladesh – A Cross-Sectional Study

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Abstract

Background: Anemia is a global public health problem affecting both developing and developed countries with major consequences on human health as well as social and economic development. It occurs at all stages of the life cycle but is more prevalent in pregnant women and young children. Anemia during pregnancy is a major cause of morbidity and mortality of pregnant women in developing countries and has both maternal and fetal consequences. Therefore, this study aimed to assess the prevalence and factors associated with anemia in Bangladeshi human subjects, especially women. **Methodology:** This cross-sectional survey was held on human subjects (N=528), of which 4% were children (n=27), 27% male (n=141), 33% non-pregnant female (n=173) and 36% pregnant female (n=187). The signs and symptoms of participants were also considered. The study participants for this study were people who were categorized as: children 6-59 months, children 5-11 years, children 12-14 years, men (15 years of age and above), non-pregnant women (15 years of age and above) and female (pregnant). The survey was held on 528 patients of children (27), male (141), non-pregnant female (173) and pregnant female (187). The questionnaire had been developed including the basic information about anemia associated with dietary habits and relevant factors in details. The questionnaire contained seven section: background information, personal information, history of patients, dietary information, signs and symptoms, diagnostic information and pregnancy status for females. Blood samples of the subjects had been tested for percentage value of hemoglobin. **Results:** The anemic children were affected by thalassemia genetically. Among the people, more than 50% were below 6 months of age. More than 80% of anemic patients had been found suffering from different diseases. Of them, 10% patients suffered from accidental blood loss. Among the female anemic patients, 63% had been habituated with excessive menstrual bleeding. Pregnant women had been found suffering from mild to moderate anemia (characterized by hemoglobin concentration) but non-pregnant had been noticed with moderate anemia. This might be due to the undiagnosed mild anemic condition in non-pregnant female. Almost 65% of pregnant women had children and among them, 58% had previous pregnancy within last 2 years. In our observation, 25% of the anemic pregnant women had previous abortion history and 34% affected by bleeding during pregnancy. The education level was below secondary in 55% of anemic adult patient. **Conclusion:** Mild to moderate anemia prevails among the study subjects. Their lifestyle modification especially intake of iron rich food and supplements seem apt in overcoming this crisis.

Keywords: Anemia, dietary habits, female pregnant, female non-pregnant, hemoglobin, male, prevalence, pregnancy.

Introduction

Anemia, a decrease in the concentration of circulating red blood cells or in the hemoglobin concentration and a concomitant impaired capacity to transport

oxygen, is a global public health problem affecting both developing and developed countries with major consequences on human health as well as social and economic development [1]. It occurs at all stages of

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the life cycle but is more prevalent in pregnant women and young children [1]. Anemia develops when there is poor, insufficient or abnormal hemoglobin or red blood cell production, excessive red blood cell loss, or excessive red blood cell destruction [2]. Each of these conditions has multiple causes, many of which can occur simultaneously in the same individual [2]. World Health Organization (WHO) considers anemia as global crisis that affects public health seriously [1-2]. According to WHO, people of any age may be vulnerable to anemia but women (menstruating, pregnant and post-partum) and children are at higher risk of developing anemia [1-2]. Globally, 30% of the women of menstruating age (15-49 years) and 30% of the pregnant are anemic while 40% of the children (6-59 months) are anemic [1-2]. United States agency for international development (USAID) broadly classifies the causes of anemia into nutrition-based (lack of iron, folate, vitamin B12) and non-nutrition based (cause or effect of different diseases, accidental bleeding, infection, inflammation, menstruation, bleeding or genetic) [3]. Anemia may be manifested either by reduced level of red blood cell (RBC) or depleted amount of hemoglobin (Hb) in the RBCs [3]. Consequently, oxygen supply to the cells become seriously affected and the anemic patient suffer from fatigue, restlessness, shortness in breath, tiredness and pale in appearance [3].

Statistical analyses of the demographic data, systematic review and meta-analyses of survey data have revealed that the population of Bangladesh are under the red signal of anemia [4-6]. According to some meta-analyses, prevalence of anemia in Bangladeshi pregnant women is 49%, in non-pregnant women 45% and in adolescent girls 43% [4-6]. Those secondary data-based studies have identified iron deficiency anemia (IDA) as the prime anemic category in Bangladesh [4-6]. Unfortunately, there is lack population based direct study or firsthand data concerning anemia status in Bangladesh. Thus, our goal was to understand the real status of the anemia condition of Bangladeshi populace through direct survey and associated hematological studies of Bangladeshi populace. In this platform, we chose one of the 64 districts of Bangladesh as the first line of nation-wide study. Our study are was Jashore district, a historically important, culturally diverse and economically important district of Bangladesh.

Methodology

Study Design

Institution-based, cross-sectional study design was employed by developing a questionnaire. The

institutions included 250 bedded tertiary public hospital and a private diagnostic clinic in Jashore municipality, Bangladesh.

Categorization of the study subjects and questionnaire development

The study participants for this study were people who were categorized as: children 6-59 months, children 5-11 years, children 12-14 years, men (15 years of age and above), non-pregnant women (15 years of age and above) and female (pregnant). The survey was held on 528 patients of children (27), male (141), non-pregnant female (173) and pregnant female (187). The questionnaire had been developed including the basic information about anemia associated with dietary habits and relevant factors in details. The questionnaire contained seven section: background information, personal information, history of patients, dietary information, signs and symptoms, diagnostic information and pregnancy status for females.

Inclusion Criteria

People who came during the study period were included in the study at the selected health institutions.

Exclusion Criteria

People who were seriously ill during the survey were excluded.

Data collection method - Cross sectional survey

The study had been conducted through a cross sectional survey among patients during the study period to collect data. A structured pretested interviewer questionnaire was used to obtain socio demographic information and present and past history of patients. To obtain dietary habit, standard food frequency questionnaire adjusted for local food item was adapted and used to assess the usual intake of various food groups for the past one month with their respective consumption frequency. The data were regularly supervised for proper data collection; all the questionnaires were checked for completeness and consistency in daily basis.

Diagnostic report collection

Diagnostic reports mentioning the hemoglobin concentrations of the subjects (Table 1) had been collected and preserved for statistical analyses [1-4].

Sample Size

The survey was held on 528 patients of children (27), male (141), non-pregnant female (173) and pregnant female (187).

Ethical Consideration

Ethical approval had been obtained from the superintendents of each institutions. Every study subject had been informed about the study purpose and their written consent had been collected.

Data analysis

Statistical analyses had been performed using microsoft office 2013. Descriptive statistics were performed and summarized by frequencies and proportion for categorical predictors.

Table 1: Hemoglobin values for defining anemia in different population groups.

Population group	Non-Anemia (Hb g/dL)	Anemia (Hb g/dL)		
		Mild	Moderate	Severe
Children 6 - 59 months	11.0 or higher	10.0-10.9	7.0-9.9	lower than 7.0
Children 5 - 11 years of age	11.5 or higher	11.0-11.4	8.0-10.9	lower than 8.0
Children 12 - 14 years	12.0 or higher	11.0-11.9	8.0-10.9	lower than 8.0
Non-pregnant women ≥15 years	12.0 or higher	11.0-11.9	8.0-10.9	lower than 8.0
Pregnant women	11.0 or higher	10.0-10.9	7.0-9.9	lower than 7.0
Men ≥15 years	13.0 or higher	11.0-12.9	8.0-10.9	lower than 8.0

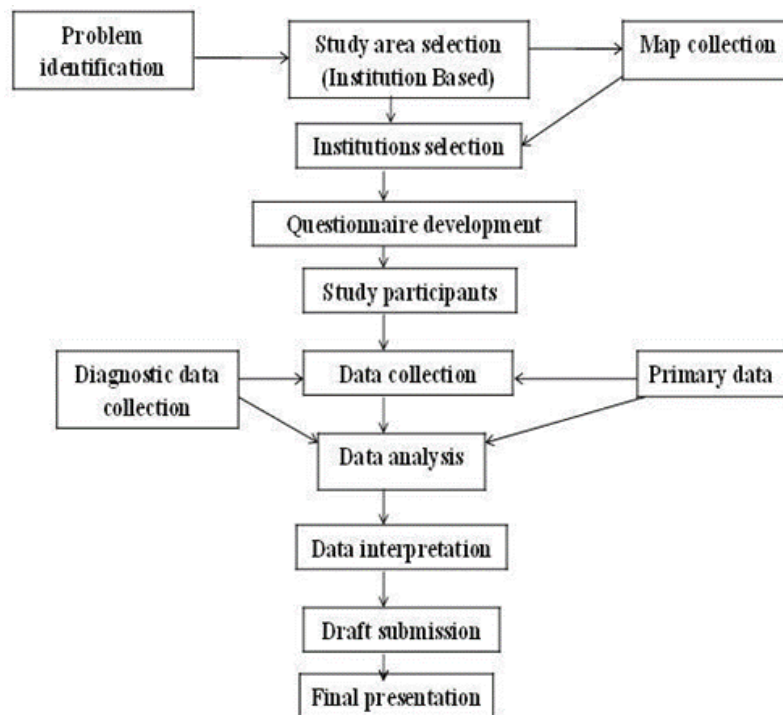


Fig 1: Conceptual flow diagram of study design.

Results and Discussion

Suffering time of anemia

Children suffering for more than two years were mostly affected by thalassemia. Most of the children were inborn affected. The pregnant patients were mostly affected after six months of pregnancy. Most of the females are anemic during pregnancy in the last stage. About 54% patients had been suffering

from anemia at about < 6 month. About 36% patients suffered from anemia during 6-12 month. It includes female and male including non-pregnant female also.

Previous history of blood loss among patients

Anemia is a situation of containing lower hemoglobin concentration in blood. It is held mainly because of blood loss for various reasons such as accidental blood loss, affected with other diseases, hereditary

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diseases (such as thalassemia) and previously affected by anemia. More than 80% patients had been suffering from diseases like tuberculosis, hookworm, piles, melena and other diseases that are indirect reason of blood loss. Few people (10.38%) loss blood by accident most of whom were male. Children are mostly affected by hereditary diseases. Among the study subjects, 23.15% had anemia before the survey of whom the non-pregnant females were top-most.

Types of other affected diseases

About 65% patients are affected by other diseases. Women in rural area are mostly affected by the disease because of sanitation problem and unconsciousness [7]. But for hookworm diseases, regular blood loss is held [8]. However no case of malaria and HIV had been found in the present study. About 19% patients were affected with tuberculosis and most of them were male. Peptic ulcer, piles, melena, hookworm and so on diseases also found. Only 14% anemic patients were free from other diseases. Our findings are in agreement with those of Saxena et al (2023) [9].

Problem of excessive menstrual bleeding

Problem of excessive menstrual bleeding is common in female [10-11]. About 63.10% females had been suffering from this problem including pregnant and non-pregnant females. Previous studies correlated these issues with IDA [10-12]. Only 36.90% female were not affected with menstrual bleeding.

Signs and symptoms of anemia

The signs and symptoms of the study subjects to identify anemia were the feeling of tiredness, irritability, loss of appetite, appear to be pale in color, shortness in breath, chest pain, gastrointestinal disease or peptic ulcer and restless legs syndrome disease [13].

Signs and symptoms of children (5-14) years

Children (5-14) years can express their problems clearly, for that they had been included in the present study. Here the number of children was 20. About 78.95% children seemed pale in color because they were affected by thalassemia. 70.6% children lost their appetite. Most of the children (86.785%) suffered from tiredness. There were also shortness in breath, chest pain, gastrointestinal disease or peptic ulcer and restless legs syndrome disease in about 56.89%, 70.4%, 24.72% and 45.6% cases, respectively.

Signs and symptoms of female pregnant

About 24.6% women seemed pale in color because

they were affected by severe anemia. About 65.78% women lost their appetite because of pregnancy. Most of the women (88.77%) also felt tiredness. There were also shortness in breath, chest pain, gastrointestinal disease or peptic ulcer and restless legs syndrome disease about 30.48%, 43.32%, 68.45% and 54.55% respectively.

Signs and symptoms of female non-pregnant

The signs and symptoms of non-pregnant women included feeling of tiredness (78.61%), irritability (61.85%), loss of appetite (56.65%), pale (12.14%), shortness in breath (50.29%), chest pain (89.02%), gastrointestinal disease or peptic ulcer (71.68%) and restless leg syndrome (81.50%), respectively.

Signs and symptoms of male

Males also felt similar signs and symptoms of those of the females but at different scales: their found the feeling of tiredness (78.01%), irritability (43.97%), loss of appetite (60.99%), appear to be pale in color (42.50%), shortness in breath (36.89%), chest pain (39.01%), gastrointestinal disease or peptic ulcer (56.74%) and restless legs syndrome (56.03%), respectively.

Diagnostic information

Diagnostic information included blood group, time of blood test, concentrations of hemoglobin (g/dl) in blood and supplementation of medicine, injection and blood [14]. By checking the hemoglobin concentrations (g/dl) the severity of anemia among people are find out.

The time of last blood test

About 82% people had their blood test within 1-2 week. Our findings tally with some previous observation [15]. Only 12% patients had their blood test within 6 months. A minor group of patients had their blood test more than 6 months ago.

Prevalence of anemia among female pregnant (n=187)

Usually, women suffer from anemia during pregnancy both in the developing and in the developed countries [16-18]. Anemia categorization (mild, moderate and severe) is usually done based on hemoglobin concentrations (normal range 8.0-10.0g/dl). In the present study, about 11.23% pregnant women are affected by severe anemia. This poses threat to both the pregnant mother and to the fetus. Mild anemia in pregnancy is common in Bangladesh after six month of pregnancy [4-6]. In the present study, about 41.71% women had been identified with mild anemia while 47.06% with moderate anemia. Our findings

correlate with those of previous studies [4-6].

Prevalence of anemia in non-pregnant female (n=173)

The adolescent girls, adult women and aged women were included in this category. 76.74% of the non-pregnant women had been identified with moderate anemia. 16.28% of the non-pregnant women were severely anemic (hemoglobin concentration < 8g/dl); 6.98% were mild anemic. These observation are in line with some previous studies [19-20].

Prevalence of anemia among male (n=141)

Most of the male subjects had been found to moderately anemic. Recently, males have been linked with alarmingly high rate of anemia [9, 21-22]. The hemoglobin concentration was (8-10.9) g/dl. About 79.29% male were affected with moderate anemia, 7.29% with mild anemia and 3.57% with severe anemia.

Supplementation

We investigated whether the subjects were involved in taking any supplementation (oral or intravenous) or had undergone blood transfusion [23-25]. About 32.10% patients would take oral supplementation of iron and folic acid. Mainly the pregnant women would take folic acid. Intravenous folic acid supplementation was about 19.84% among patients. About 29.66% patients would undergo blood transfusion. However, 18.40% patients would not take any supplementation or undergo blood transfusion.

Further investigation about pregnant women (n=187)

Number of children

Recently, number of children has been linked with anemia [26-27]. In the present study, 34.76% women had no children but they were pregnant. Only 2% people had 4 or more than 4 children. 37.57% people had only one child. 25.67% women had 2-3 children.

Birth interval between the last to present pregnancy

Birth interval between the last to present pregnancy is an important factor of anemia [28-30]. To avoid anemia, more than two year interval is recommended between the last and present pregnancy. The possibility to be anemic is higher around two year interval. More than 40% women had been found to become pregnant within two year interval. Though, 28.88% women became pregnant after two year interval, 30.66% women had no birth interval because of first pregnancy.

Situation of abortion and bleeding

Abortion is another associate factor of anemia [31-32]. About 25% women had undergone abortion and 34.2% of pregnant women had been suffered from bleeding. It is the cause of anemia also.

Personal details

As lifestyle had been intricately linked with anemia progression and lifestyle modification stands among the most discernible recommendation to overcome anemia [33-34], we collected some background information of our study subjects that included the following information.

Status of the participants

About 55.91% people were housewife, 10% were students (both male and female), 20.84% were service holders (mostly male), 13.25% were involved in business.

Main sources of income

Business was the main source of income of the male participants (46.49%) followed by farming (26.85%) and service (23.65%).

Educational level

In the present study, 28.86% participants were primarily educated, 27.45% secondary, 23.65% higher secondary and 10% participants were graduate. Most of the housewives were primarily and secondarily educated (including some uneducated also).

Dietary habits

Dietary habits of children (5-14) years

Dietary habits severely affects anemia [35-37]. Food items included in the dietary table of the present study was rich with iron and folic acid. Children had not been found with regular tea drinking. They also would not take red meat and vegetables regularly rather they were accustomed with regular fish intake.

Dietary habits of non-pregnant women (15 years of age and above)

About 80.4% non-pregnant women would eat red meat monthly and 58.9% women would drink tea or coffee regularly. Among them, some would drink twice per day. 21.4% women would eat green vegetables daily. About 6.36% women would eat fish regularly and 4.9% women would never. More than 10% women would never eat citrus fruits.

Dietary habits of female (pregnant)

About 77.54% pregnant women eat red meat monthly, 64.17% would drink tea or coffee regularly.

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Among them some would drink twice per day. 64.1% women would eat green vegetables daily while 18.72% women would eat fish regularly eat fish and 3.74% never. More than 13% women would never eat citrus fruit.

Dietary habits of men (15 years of age and above)

About 60.28% men would eat red meat monthly, 79.72% men would drink tea or coffee regularly. Some of them drink twice or three times per day. 79.72% men would eat green vegetables, 14.18% men would take fish regularly while 3.55% would never eat fish. More than 14.18% men would never eat citrus fruits.

Conclusion

This paper provides a comprehensive surveillance of the changes in the prevalence and the extent of anemia among different population groups of Jashore district in Bangladesh. The report also focuses on various factors related of anemia in the country. This document elucidates the estimation of the prevalence of anemia among the people of all categories including children, men, non-pregnant women and pregnant women for the year 2021 to 2022 in Jashore region of Bangladesh. This document may serve as a resource for estimating anemia epidemiology and in formulating therapeutic strategies against anemia considering Bangladesh and global perspectives.

Declarations

Data availability

All the data used to prepare this article are available from the corresponding author on request.

Questionnaire

Questionnaire used to collect data of the present study is available from the corresponding author on request.

Conflicts of interest

Authors declare no competing interest of any sort.

Author contribution

Md. Sohel Parvez and Esrat Sultana collected the data and performed statistical analyses; Selina Akter supervised the data collection and analyses; Mohammad Azizur Rahman prepared and edited the manuscript.

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Ethical statement

Prior permission had been taken from the superintendents of the respective health complexes and hospitals. Every study subjects had been informed about the aims and objectives and procedure of the study. Their written consent had been collected and preserved.

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