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Anemia among Garment Factory Workers in Bangladesh

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Abstract: A total of 2.4 million men and women are employed in Garment industries of Bangladesh. Among them a remarkable number is lean and thin due to anemia. Contributing factors which may cause anemia are inadequate and inappropriate diet and poor absorption of iron by the body, poor nutrition and dietary knowledge and practices, poor hygiene and sanitation practices, lack of access to health services and poverty. Accordingly, the present study was aimed to find out the anemia status among garment workers. This cross sectional study was conducted on 106 garment workers of Mirpur thana under Dhaka city. Hemoglobin (Hb) was measured by Cyanmethemoglobin method. Statistical analysis was performed by appropriate univariate and multivariate techniques using SPSS windows 11.5. The age of the study subjects was 24.85 ±7.11. Among the participants 25% were underweighted, 56% were normal weighted, 17% were over weighted and the rest were obese. In consideration of sex, 11% male were anemic, whereas the percentage of female were 77%. In case of female subjects 19 % were mild anemic, 50% were moderately anemic and 8% were severely anemic. Among the male 8% were mild anemic and 3% were moderately anemic. Significant association was found between Body Mass Index (BMI) and hemoglobin level ($r = 0.23$, $p= 0.02$) of the study subjects. It can be concluded that the female subjects (77%) are more anemic than male subjects. There is a significant association between BMI and Hb level ($r = 0.23$, $p< 0.02$) of the garment workers in Bangladesh.

Key words: Anemia · Garment Worker · Iron · Hemoglobin · Bangladesh

INTRODUCTION

Iron deficiency anemia (IDA) is considered as the most important contributing factors to the global burden of diseases [1]. Hemoglobin (Hb) concentration is the most reliable indicator of anemia at the population level. Measuring Hb concentration is relatively easy and inexpensive and this measurement is frequently used as a proxy indicator of iron deficiency. However, anemia can be caused by factors other than iron deficiency. In addition, in populations where the prevalence of inherited hemoglobinopathies is high, the mean level of Hb concentration may be lowered [2].

Anemia is defined as a low level of hemoglobin in the blood, as evidenced by a reduced quality or quantity of red blood cells. World Health Organization has identified anemia as one of the most serious public health problem. The hemoglobin concentration lower than the established cutoff value defined by the World Health Organization as a hemoglobin value <13gm/dl for men ≥ 15years, <12gm/dl for non pregnant women, lactating mother and children of ≥ 12.00-14.99 years of age group and <11gm/dl in case of pregnancy [3]. Anemia hampers physical and mental performances, immunity and productivity and in pregnancy is also related to intrauterine growth retardation [3]. These effects are not only harmful to

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human health but they also have an impact on social and economic development. Economic losses due to iron deficiency in South Asia have been estimated at USD 5 billion annually [4]. Moreover, it was found that anemia and iron deficiency cause reduced physical work capacity [5]. Iron deficient workers with low hemoglobin concentrations were reported to have lower work outputs than their healthy workers. Anemia also results in reduced work productivity. It is estimated that 7.9 % of Gross domestic Product (GDP) in Bangladesh is lost due to anemia [6]. Inadequate dietary intake of energy, protein and micronutrients constitute the primary and most direct cause of nutritional anemia in Bangladesh.

Amongst the workers about 70 per cent are women, who work dawn to dusk even up to late night when their wages are not in the satisfactory level. They cannot afford their foods, cloths, housing, medicines and educations of their wards as they are ill paid [7]. In every aspect of life they are receiving less attention, especially in terms of food and health care. Female garments worker are the worst sufferers. During activity nutritional demand of the garment worker are commonly not met and they lose their vigor and strength. Nutritional problems of garment worker may be greater and more widespread than previously thought. It is likely that the scale of nutritional problems of garment workers may have previously been underestimated [8]. More data on health and nutrition of garment worker are needed to assess the scale of their nutritional problems. Poor dietary habit leads to decreased level of hemoglobin of blood. But information on dietary pattern of garment worker is not adequate. This is the usual scenario in Bangladesh.

The government of Bangladesh has recently made an effort to address the health needs of our country people. Under the current Health Nutrition and Population Sector Program (HNPSP) 1998-2003, the government of Bangladesh has created the Maternal Nutrition and Adolescent Health Program (MNADH) as a component of reproductive health care under the essential service package (ESP) [9] but there is no specific program for garments worker. Some Non Government Organizations' (NGO's) are working for them which are not sufficient.

It is important to know the status of the iron deficiency anemia because the productivity of the garment workers mostly depends on the healthy condition including non anemic stage. So, the present study has been undertaken to assess the level of anemia by measuring hemoglobin level among garments workers attending in Dhaka city. It is hoped that the outcome of this research would facilitate the understanding of nutritional status of the garment workers in Bangladesh.

MATERIALS AND METHODS

This cross sectional study was conducted on 106 garment workers of Mirpur thana under Dhaka city using standard sample size estimation formula $n = Z^2pq/d^2$. Subjects whose age was 15 years and more than 15 years, presently working and have at least six months working experience in a garment were included; lactating mothers and pregnant women were excluded from the study. Demographic and socioeconomic data on the subjects were collected using a standard interviewer-administered questionnaire. Pre-test was carried out for measuring the suitability of the contents, clarity, sequence and flow of the questionnaire. Age was recorded from birthday by calendar, standing height was recorded without shoes and with light cloths on a wall mounted measuring tape to the nearest of centimeters, weight was recorded without shoes and with light cloths on a weighing machine. BMI was calculated by the formula: BMI = Weight (kg)/ Height (m^2). International Obesity Task Force (IOTF-2000) has proposed the standards for adult obesity in Asia and India as follows: A cut-off point of <18.49 kg/m^2 is used to define underweight, 18.5-22.9 kg/m^2 is used to define normal, 23-27.49 kg/m^2 is used to define overweight and a BMI of over 27.50 kg/m^2 indicates obese [10]. Subjects were given a prescheduled time for data and blood sample collection. Blood was taken by the venepuncture method. Hemoglobin level was measured from Shakti Foundation, Mirpur and Z H Sikder Hospital at Gulshan by following Cyanmethemoglobin method standard procedure protocol. Anemia was defined as hemoglobin <12 g/dl for females or <13 g/dl for males. In females, anemia was also classified as mild, moderate and severe based on Hb level 11.00-11.99gm/dl, 8.00-10.99gm/dl and < 8 gm/dl respectively. The same values also account in males except the value for mild anemia where the value is 11.00-12.99gm/dl [11]. All ethical issues, which are related to this research involving human subjects were followed according to the guideline of Bangladesh Diabetic Somiti (BADAS) ethical review committee. A written consent was taken from all subjects after full explanation of the nature, purpose and potential risks of all procedures used for the study.

Statistical analysis was performed using SPSS (Statistical Package for Social Science) software for Windows version 10 (SPSS Inc., Chicago, Illinois, USA). All the data were expressed as mean ± SD (standard deviation), median (range) and/or percentage (%) as appropriate. The statistical significance of differences between the values was assessed by ANOVA or Mann–Whitney U test (as appropriate). A two-tailed p value of <0.05 was considered as statistically significant.

RESULTS

The age (years, mean ± SD) of the study subjects was 24.85 ±7.11. Considering sex, 34% were male and 66% were female. Among the participants 54% were married and data revealed that a small portion (14%) was illiterate, 33% had up to primary, 46% had secondary and only 7% had higher secondary level education. The monthly income and expenditure (BDT, mean ±SD) of the study subjects was 7363.21±2525.46 and 3166.98±1153.19 respectively (Table 1).

Table 2 presents general characteristics of the study population by BMI categories. The Body Mass Index (BMI) of the participants was (mean±SD) 20.59±2.96. Among the participants 25% were underweighted, 56% were normal weighted, 17% were over weighted and the rest of 2 were obese.

The Hemoglobin (Hb) level (gm/dl, mean ± SD) of the study subjects was 11.29± 1.91. Among the female participants only 23 % were normal, 19% were mild anemic, 50% moderately anemic and rest of them 8 % was severely anemic. On the other hand, among the male participants, most (89%) were normal, 8 % were mild anemic, 3% were moderately anemic and there were no severely anemic male participants (Table 3).

Among the participants in a comparison of hemoglobin level of male and female, male were less anemic than female participants. Only 11% male were anemic, where 77% female were anemic. On the other hand, 89% male were non anemic and 23% female were non anemic (Figure 1).

Among the illiterate groups 46.7% were non anemic, 6.6% were moderately anemic and 46.7% were mild anemic. In the primary groups 31% were non anemic and rest of others were anemic. The majority who had secondary level education 51% of them were non anemic. The participants who had higher secondary level education among them 42.8% were non anemic 28.6% were moderately anemic and 28.6% were mild anemic.

Table 1: Socioeconomic characteristics of the study subjects (n=106)

Parameter	Percentage
Age (Years)	24.85 ±7.11
Sex	
Male	36 (34%)
Female	70 (66%)
Marital status	
Unmarried	49 (46%)
Married	57 (54 %)
Education	
Illiterate	15 (14%)
Primary	35 (33%)
Secondary	49 (46%)
Higher secondary	7 (7%)
Income	
Monthly Income (BDT)	7363.21±2525.46
Monthly Expenditure (BDT)	3166.98±1153.19

Results are expressed as mean ±SD, number (%)

Table 2: Distribution of the study subjects by their BMI class (n=106)

Parameter	Number	Percentage
BMI status	20.59±2.96	
<18.49 (underweight)	27	25 %
18.5-22.9 (normal)	59	56 %
23-27.49 (over weight)	18	17 %
>27.50 (obese)	2	2 %
	Total No.= 106	100%

Results are expressed as mean ±SD, number (%)

Table 3: Distribution of the study subjects by the level of hemoglobin (Hb) (n=106)

Parameter	Number	Percentage (%)
Level of the hemoglobin(g/dl)	11.29± 1.9	
Female (n=70)		
=12.00gm/dl (normal)	16	23
11.00-11.99gm/dl (mild anemia)	13	19
8.00-10.99gm/dl (moderate anemia)	35	50
<8 gm/dl (severe anemia)	6	8
Male (n=36)		
=13.00gm/dl (normal)	32	89
11.00-12.99gm/dl (mild anemia)	3	8
8.00-10.99gm/dl (moderate anemia)	1	3
<8gm/dl (severe anemia)	0	0

Results are expressed as mean ±SD, number (%)

No significant association was found ($\chi^2 = 12.38$, p= 0.19) between education and Hb level of the study subjects (Table 4).

Total monthly income of the groups was not significant with p value 0.37 and the mean of anemic group was BDT 7458.33 and that of non anemic group was BDT 7239.13. On the other hand, total monthly expenditure of the groups was not significant with p value 0.17 and the mean of anemic group was BDT 3120.00 and that of non anemic group was BDT 3228.26 (Table 5).

Table 4: Difference of the education level vs Hb status of the study subjects (n=106)

	Hb status			
Education status	Non anemic (%)	Mild anemia (%)	Moderate anemia (%)	Severe anemia (%)
Illiterate	7 (46.7%)	7 (46.7%)	1 (6.6%)	0 (0%)
Primary	11 (31%)	9 (26%)	13 (37%)	2 (6%)
Secondary	25 (51%)	16 (33%)	6 (12%)	2 (4%)
Higher secondary	3 (42.8%)	2 (28.6%)	2 (28.6%)	0 (0%)
χ^2 /p	12.38/ 0.19			

Results are expressed as number (%), X^2- test was performed as a test of significance

Table 5: Monthly income and expenditure of the family based on hemoglobin level (n=106).

Hemoglobin level	Monthly income of the family	Monthly expenditure of the family
Non anemic	7239.13±2187.69	3228.26±1272.38
Anemic	7458.33±2771.11	3120.00±1061.467
t/p	0.80/ 0.37	1.92/ 0.17

Result are expressed as number (%)

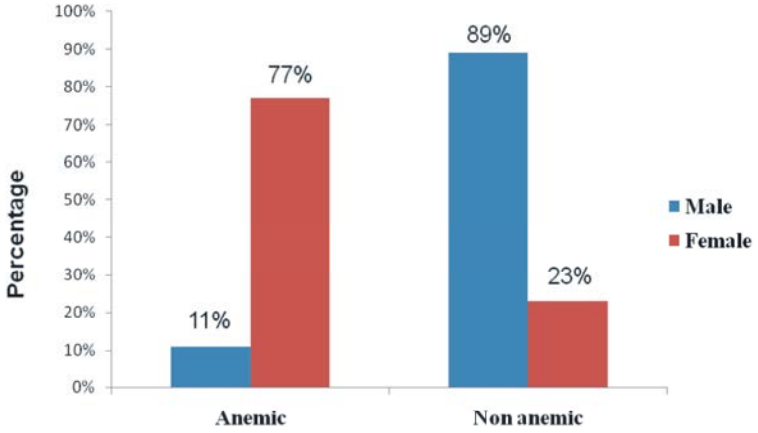

Fig. 1: Comparison of Hb status between male and female (n=106)

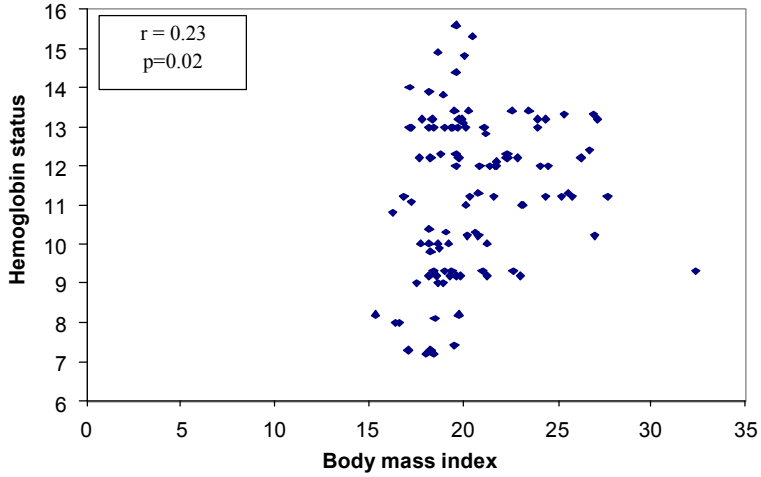

Fig. 2: Association between Body Mass Index (BMI) and hemoglobin level of the participants (n=106)

The study showed a significant association between Body Mass Index (BMI) and hemoglobin level ($r = 0.23$, $p = 0.02$) of the study subjects (Figure 2).

DISCUSSION

Anemia affects more than a billion people globally and is recognized as a major public health problem in developing countries. Iron deficiency is considered to be the main cause of anemia [3]. More attention has been paid to the developing countries like Bangladesh. The productivity of the worker (both male and female) is a key to the development of a country [12,13]. The present study was taken to assess the hemoglobin status among garment workers in selected industries of Dhaka city in Bangladesh.

In this study, we observed that most of the male are non anemic whereas most of the females are anemic. In one population- based study in Bangladesh it was found that 45% female garment workers were anemic by using cut-off value ≤11g/dl [14]. In the present study most of the female subjects (77%) were anemic and among them mild 19%, moderate 50% and severe 8% by using WHO cut off values, though only 11% male subjects were found anemic in the study by using same cut-off values [11].

In developing country like Bangladesh, females are always lagging behind compared to males in all spheres of life. In Kenya, only 17% female workers and 26% male workers had marginal or deficient Hemoglobin values (<12 g/dl) [15]. In the present study mean BMI of the garment workers was {(Kg/m^2, mean ±SD), 20.59±2.96. More than half of the subjects (56%), 17 and 2% belonged to normal group, overweight and obese group respectively [10]. Anemic group had higher income compared to non-anemic group though opposite picture was found in case of expenditure.

In a recent study it was found that there was an inverse association between overweight/obesity, central obesity and anemia in Chinese women from Jiangsu Province [16]. But, our study showed that the indicator of obesity (BMI) was significantly correlated with Hb level ($r = 0.23$, $p < 0.02$).

The main limitation of our study is that we used only hemoglobin as an indicator of anemia which only represents a part of the complex assessment of iron status. By this study it cannot be distinguished anemia of chronic disease and anemia caused by iron deficiency.

From the study it can be concluded that the female subjects (77%) are more anemic than male subjects (17%). Socioeconomic condition such as education and income did not play any significant role on anemic status. There was a significant association between BMI and Hemoglobin level ($r = 0.23$, $p < 0.02$) of the garment workers in Bangladesh.

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