

# The Association of Dietary Intake and Iron Deficiency Anemia with The Socioeconomic Status in General Population of Faisalabad

Muhammad Hasnain Tahir, Mulazim Hussain Bukhari, Zarmina Gillani, Sardar Muhammad Al Fareed Zafar

## ABSTRACT

**Objective:** To determine the association between dietary intake and iron deficiency anemia and to know the different methods for assessing the nutritional status. **Study design:** A cross-sectional survey. **Setting:** It was conducted in Faisalabad. **Sample size:** On 216 Subjects (11-40 years of age). **Period:** Six months from 01-10-2015 to 31-03-2016. **Sampling technique:** They were selected by simple random sampling living in during the study period. **Data collection procedure:** Data was collected by taking the history and physical examination of cases and taking their weight and height. Data was analyzed through SPSS version 21 and entered in proforma. **Results:** The 38.43% of the participants were having anemia, among them 21.76% of the participants were having mild anemia, 15.74% of the participants were having moderate anemia and 0.93% of participants were having severe anemia. The 34.25% of participants were underweight and 9.7% participants were overweight. More than 55% of females were suffering from anemia. So far the methodology on the basis of hypothesis of Z-test I have arrived at the conclusion at C.I. 98% following results were found. This distinguished class signifies the percentage anaemic patients. **Conclusion:** Most of the female participants were having anemia. There was a significant association between the intake of meat and hemoglobin level. So special measures should be taken to provide dietary education especially to females to have healthier mothers in the future.

**Keywords:** Iron deficiency anemia, Nutritional status, General Population, under weight

### Corresponding Author

**Prof. Dr. Mulazim Hussain Bukhari**  
Professor of Pathology  
Punjab Medical College, Faisalabad  
Contact: +92 300-8414743  
Email: mulazim.hussain@gmail.com

Submitted for Publication: 10-06-2016

Accepted for Publication: 29-03-2017

**Article Citation:** Tahir MH, Bukhari MH, Gillani Z, Zafar SMAF. The Association of Dietary Intake and Iron Deficiency Anemia with The Socioeconomic Status in General Population of Faisalabad. APMC 2017;11(1):63-67.

## INTRODUCTION

Despite the efforts of government and non-government organizations, nutritional deficiencies and anemia remains a major public health problem especially in people with low socio-economic status.<sup>1</sup>

Anemia is usually defined as a decrease in the amount of red blood cells (RBCs) or hemoglobin in the blood.<sup>2</sup>

Iron deficiency is thought to be the most common cause of anemia globally, but other nutritional deficiencies (including folate, vitamin B12 and Vitamin A), acute and chronic inflammation, parasitic infections and inherited or acquired disorders that affect hemoglobin synthesis, red blood cell production or red cell survival, can all cause anemia. Hemoglobin concentration alone cannot be used to diagnose iron deficiency. However, the prevalence of anemia is an important health indicator and when it is used with other measurements of iron status the hemoglobin concentration can provide information about the severity of iron deficiency.<sup>3-5</sup>

Haem iron found in meat, fish and poultry, is much better absorbed than non-haem iron, which is found in eggs, grains, vegetables and fruits.<sup>3-4</sup>

Liver, kidney, beef, chicken, tuna, egg yolk, iron-fortified cereals, dried fruits, nuts, dried peas, beans and dark green leafy vegetables are among the foods that rank highest in iron content. Foods that contain tannins, including coffee and tea, can reduce non-haeme iron absorption by 50 to 60 percent. Legumes and grains contain substances called phytates that limit iron absorption, and certain proteins found in soybeans also have this effect. Phosphates, which are found in some types of soda, calcium and fiber may also hinder iron absorption.<sup>2</sup> Processed wheat bran can also play role in the absorption of iron. Dairy products also help to absorb more iron if your iron levels are low. Vitamin C with iron-rich foods will help to absorb the iron more frequently.<sup>5</sup>

Orange juice with your meal enhance the absorption of iron in body. Addition of meat servings during meal times also help to enhance the absorption of

iron.<sup>15</sup> Avoid use of tea with meals because it is the major fact to reduce the amount of iron that is absorbed in body. The majority of phenolic compounds are found in the leaves, stems and flowers and highly reactive to form iron-phenolic complexes in the intestine then iron less available for absorption.<sup>1</sup>

Recently, there has been increasing interest from epidemiologists on the subject of economic inequality and its relation to the health of populations. Socioeconomic status is an important source of health inequity, as there is a very robust positive correlation between socioeconomic status and health.<sup>16</sup> This correlation suggests that it is not only the poor who tend to be sick when everyone else is healthy, but that there is a continual gradient, from the top to the bottom of the socio-economic ladder, relating status to health. Moreover, Different Socioeconomic statuses have a strong relationship with different dietary intakes.<sup>6, 7</sup>

This present study was conducted as very little information about the nutritional status of General population in Faisalabad is known. Recent studies in Faisalabad on Nutritional assessment were mainly on pregnant women and were conducted in hospital setup therefore there was a dire need to have a study for nutritional assessment of General population to establish a basic information and data to enable government and non-governmental organizations to formulate policies for the well-being of population of Faisalabad as this population forms a major contribution in the population of Pakistan.

## METHODOLOGY

**Study Design:** A cross-sectional and descriptive survey.

**Place of Study:** It was conducted in Faisalabad.

**Period:** Six months from 01-10-2015 to 31-03-2016.

**Method:** This study was among the general population in which 216 subjects were enrolled (108 subjects were males and 108 were females), (Age=11-40 years) living in that area during the period January to March 2016.

The population was divided into three groups. A. < 18 years, B > 18 years, and C > 30 years. All married, unmarried, healthy willing persons were included after getting informed consent; they filled the forms. Study tool was the structured Questionnaire. Confidentiality of all the data was ensured. A questionnaire was designed to see the status of nutrition and association of anaemia.

Measuring tapes, Weighing scales (analogue) and stationery were used for the collection of data. Body mass index (BMI) was calculated by using the formula weight (Kg)/height (m<sup>2</sup>). The participant

standing at the center of the scale and not holding anything, adjusting scale at zero. Measurement taken from heel to knee, knee to hip, hip to shoulder and shoulder to top of the head. BMI was calculated and categorized in to four groups.

1. Underweight less than BMI of 19 kg/m<sup>2</sup>
2. Normal BMI of 19.8-24.9 kg/m<sup>2</sup>
3. Overweight BMI OF 25-29.9 kg/m<sup>2</sup>
4. Obese BMI of more than 30 kg/m<sup>2</sup>

Food Frequency Questionnaire was filled by participants by recalling dietary intake during last one week. Pilot testing of questionnaire was carried out and editing of questionnaire was done accordingly. Level of Hemoglobin was checked by taking the blood samples of all the participants. Anemia was categorized by assessing the normal level of HB as follows:

**Table 1: Normal level of Hb according to age**

| Age                       | HB Level (g/dl) |
|---------------------------|-----------------|
| Females 12-18 years       | 12.0-16.0       |
| Males 12-18 years         | 13.0-16.0       |
| Female more than 18 years | 12.1-15.1       |
| Males more than 18 years  | 13.6-17.7       |
| Middle age Males          | 12.4-14.9       |
| Middle age Females        | 11.7-13.8       |

## RESULTS

The anaemia was more prevalent in children, < 18 years, as compared to peoples above 18 and middle age group people. The division of participants according to socio-economic status was like, 46 in upper class, 125 of middle class and 45 lower class. (Table2)

**Table 2: Relationship of Socioeconomic Status with BMI**

|                             | Underweight    | Normal         | Overweight     | Obese |
|-----------------------------|----------------|----------------|----------------|-------|
| <b>Upper Class (n=46)</b>   | 6<br>(13.05%)  | 28<br>(60.87%) | 12<br>(26.08%) | Nil   |
| <b>Middle Class (n=125)</b> | 46<br>(36.8%)  | 70<br>(56%)    | 9<br>(7.2%)    | Nil   |
| <b>Lower Class (n=45)</b>   | 22<br>(48.89%) | 23<br>(51.11%) | Nil            | Nil   |

There were more overweight participants in the upper class as compared to middle and lower class. Maximum number of underweight participants were

in lower class. There was no obese participant in all the three socioeconomic classes. (Table 2)

More people were affected with anemia in lower class as compared to others. There were 62%, 43.6%, 37% people affected with anaemia in lower, middle and upper class respectively. (Table 3)

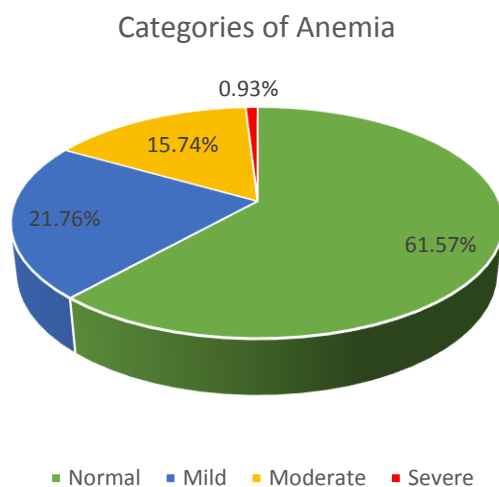
**Table 3: Relationship of Anemia with Socioeconomic status:**

|                                     | Mild        | Moderate    | Severe    | Normal      |
|-------------------------------------|-------------|-------------|-----------|-------------|
| <b>Upper Class (n=17/46) 37%</b>    | 7 (15.21%)  | 10 (21.75%) | Nil       | 29 (63.05%) |
| <b>Middle Class (n=38/87) 43.6%</b> | 28 (22.4%)  | 10 (8%)     | Nil       | 87 (69.6%)  |
| <b>Lower Class (n=28/45) 62%</b>    | 12 (26.67%) | 14 (31.11%) | 2 (4.44%) | 17 (37.78%) |

The frequency of anemia was far more in females than in males. More than half of the females were suffering from Anemia. (Table 4)

**Table 4: Relationship of Anemia with Gender**

|                    | Anemic      | Normal      |
|--------------------|-------------|-------------|
| Male (total=108)   | 21 (19.45%) | 87 (80.56%) |
| Female (total=108) | 60 (55.56%) | 48 (44.44%) |



**Figure 1: Showing 21.76% of all the participants have mild anemia, 15.74% were suffering from moderate anemia and only 0.93% participants were having severe anemia**

The intake of fruits, vegetables, milk and eggs showed no association with the anemia, however, those participants that were taking milk, meat, fruits and vegetables were mostly having hemoglobin level in normal range. Participants that were taking fats and oils more than 4 times a week were mostly overweight.

Moreover, none of the participant taking meat and meat products more than 4 times a week had anemia.

## DISCUSSION

The observed association between child's age and anemia has been reported in several other studies worldwide, similarly nutritional anemia was more common in children under 18 years as compared to other two groups<sup>8</sup>

The study showed that anemia had a strong relationship with gender as prevalence of anemia among females was more than 55% as compared to males that had anemia in only 19.45% of the participants. Moreover, severe anemia was only found in females. One reason was male preferred families in Faisalabad, more diet was given to male members as compared to female members of the house. This practice was more common in lower socio-economic class. Our study findings are similar with Jones et al (2016) who found more obesity and anemia in females as compared to males<sup>9</sup>

According to the socioeconomic status more underweight were found among participants of Lower class due to under-nutrition and more overweight were found among participants of Upper class due to intake of fatty meals. So overweight was found to be a problem of participants of upper class and under-nutrition and underweight was found to be a problem of lower class.<sup>14</sup> The results are similar to other studies where the anaemia was associated with low socioeconomic groups and with obese people.<sup>6, 10, 11</sup>

The intake of Fruits, vegetables, milk and eggs have no statistical association with the hemoglobin level but participants taking meat and meat products more than 4 times a week were not found to have anemia at all.<sup>12</sup> An interesting thing that was found among the participants that those participants which were educated or the adolescents whose parents were educated were mostly normal and the un-educated participants from any class even if they were from upper socioeconomic class were mostly either overweight or underweight.<sup>13</sup>

## CONCLUSION

Anaemia was most prevalent in the female participants presented population. The disease was

significantly associated with the intake of meat and other dietary elements.

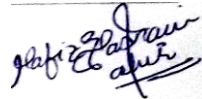

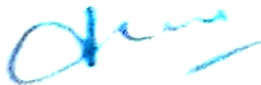

## RECOMMENDATIONS

It is concluded that Anemia specifically iron deficiency anemia is a serious health problem of Faisalabad. Association of different food items was not statistically significant but the participants taking fruits, milk, vegetables, meat and meat products were mostly have their hemoglobin level in normal range. This shows that balance diet has a positive role in maintaining healthy life. So special attention should be given on the dietary education of the population of Faisalabad. Anemia is even a bigger problem of females as compared to males, so special importance should be given on them as they are the future mothers and they should be monitored and reported on routinely basis as to prevent future adverse outcomes.

## REFERENCES

1. Yue A, Marsh L, Zhou H, Medina A, Luo R, Shi Y, et al. Nutritional Deficiencies, the Absence of Information and Caregiver Shortcomings: A Qualitative Analysis of Infant Feeding Practices in Rural China. *PloS one*. 2016;11(4):e0153385.
2. WHO. Anaemia 2016 [Available from: <http://www.who.int/topics/anaemia/en/>].
3. Stevens GA, Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F, et al. Nutrition Impact Model Study Group (Anaemia). Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995-2011: a systematic analysis of population-representative data. *Lancet Glob Health*. 2013;1(1):e16-25.
4. Zanin FH, da Silva CA, Bonomo E, Teixeira RA, Pereira CA, dos Santos KB, et al. Determinants of Iron Deficiency Anemia in a Cohort of Children Aged 6-71 Months Living in the Northeast of Minas Gerais, Brazil. *PloS one*. 2015;10(10):e0139555.
5. Thomas D, Chandra J, Sharma S, Jain A, Pemde HK. Determinants of Nutritional Anemia in Adolescents. *Indian pediatrics*. 2015;52(10):867-9.
6. Wu L, Yang Z, Yin SA, Zhu M, Gao H. The relationship between socioeconomic development and malnutrition in children younger than 5 years in China during the period 1990 to 2010. *Asia Pacific journal of clinical nutrition*. 2015;24(4):665-73.
7. Jia N, Zhang S, Li T, Tan Z, Yin Y, Chen L, et al. Dietary survey of anaemic infants and young children in urban areas of China: a cross-sectional study. *Asia Pacific journal of clinical nutrition*. 2015;24(4):659-64.
8. Oliveira D, Ferreira FS, Atouguia J, Fortes F, Guerra A, Centeno-Lima S. Infection by Intestinal Parasites, Stunting and Anemia in School-Aged Children from Southern Angola. *PloS one*. 2015;10(9):e0137327.
9. Jones AD, Hayter AK, Baker CP, Prabhakaran P, Gupta V, Kulkarni B, et al. The co-occurrence of anemia and cardiometabolic disease risk demonstrates sex-specific sociodemographic patterning in an urbanizing rural region of southern India. *European journal of clinical nutrition*. 2016;70(3):364-72.
10. Rodriguez-Zuniga MJ. [Obesity, overweight and anemia in children from a rural area of Lima, Peru]. *Medicina*. 2015;75(6):379-83.
11. Srinivasa Rao P, Srikanth S. Prevalence of anemia in the first trimester of pregnancy in rural population of Krishna district in Andhra Pradesh. *Sch. J. App. Med. Sci.*, 2013;1(5):570-574.
12. K. Shridhar, P. K. Dhillon, L. Bowen et al., Nutritional profile of Indian vegetarian diets—the Indian Migration Study (IMS). *Nutr J*. 2014;13:55.
13. Weigel MM, Armijos RX, Racines M, Cevallos W. Food Insecurity Is Associated with Undernutrition but Not Overnutrition in Ecuadorian Women from Low-Income Urban Neighborhoods. *Journal of environmental and public health*. Volume 2016 (2016), Article ID 8149459.
14. Sharma P, Mehta S, Nagar R. Prevalence of anemia and socio-demographic factors associated with anemia among pregnant women attending antenatal hospital in Jaipur City India. *IOSR J Pharma Bio Sci*. 2013;6:1–5.
15. Singh R1, Singh A K, Gupta A C, Singh HK. Correlates of anemia in pregnant women. *IJCH*. 2015;27:351-355.
16. Neveditha K, Shanthini NF. Knowledge attitude and practises of pregnant women regarding anemia, iron rich diet and iron supplements and its impact on their Hb levels. *Int J Rep Contra Obs*. 2016;5:425-31.

## AUTHORSHIP AND CONTRIBUTION DECLARATION

| <b>AUTHORS</b>  | <b>Contribution to The Paper</b>   | <b>Signatures</b>   |
|---|--|---|
| <b>Dr. Muhammad Hasnain Tahir</b><br>MBBS Student<br>Punjab Medical College, Faisalabad   | Conceived the main concept of research,<br>collected the samples, draft the main<br>manuscript |  |
| <b>Prof. Dr. Mulazim Hussain Bukhari</b><br>Professor of Pathology<br>Punjab Medical College, Faisalabad                            | Supervised the whole project   |  |
| <b>Dr. Zarmina Gillani</b><br>Assistant Professor, Department of<br>Food Science & Technology<br>The Islamia University, Bahawalpur | Reviewed the article   |  |
| <b>Prof. Dr. Sardar Muhammad<br/>Al Fareed Zafar</b><br>Principal, Punjab Medical College<br>Faisalabad                             | Helped in the manuscript writing   |  |