

## Short Communication

# Blood group and anemia: Exploring a new relationship

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**Anemia is a huge public health and nutrition problem with serious consequences. Though oral supplementation of iron, vitamin B12 and folic acid are most commonly used as a therapeutic measure to correct anemia; it is suggested that the oral supplementation of iron is not the best way to correct anemia especially due to its adverse effect on some other body functions and other complications. Under this situation it is far better to take the preventive measure to combat anemia by taking iron or vitamin rich diet, especially to those who are more prone to anemia. But the type of such population is not known to us. So, the objective of the present study is to find out whether there is any relation of blood group in occurrence of anemia to recommend the appropriate preventive measure to eradicate anemia. For this the whole blood of suspected anemic patients was collected in fasting condition and the RBC count, hemoglobin concentration and blood group of all of the anemic patients were determined. It is observed that O type of individuals are comparatively resistant to anemia in spite of large frequency distribution of O groups in general population whereas anemia is relatively prone to the individuals having blood group B, A or AB.**

**Key words:** Anemia, blood group, iron deficiency anemia, relation between blood group and anemia.

## INTRODUCTION

Anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. As per the World Health Organization (WHO) database on anemia globally, anemia affects 1.62 billion people (95%), which corresponds to 24.8% of the population. WHO also estimates that anemia contributes to about 20% of maternal and perinatal death in developing countries (Harvey, 2004). Though, the oral iron supplementation is a very common therapeutic measure to correct anemia it should be only used when dietary measures have failed. Moreover, iron supplement cannot correct anemia which is not due to iron deficiency (<http://health.nytimes.com/health/guides/disease/anemia/treatment.html>). Besides this, iron replacement therapy

can cause gastrointestinal problems like nausea, vomiting, diarrhea, constipation and even iron tablets can aggravate existing gastrointestinal problems, e.g. ulcers and ulcerative colitis (Notebaert et al., 2007). Long term iron supplementation also contributes to heart disease, diabetes mellitus and certain type of cancers (Maguire et al., 2007). It is also reported that iron tablets may also reduce the effectiveness of other drugs including the antibiotics tetracycline, penicillamine, ciprofloxacin, Parkinson's disease drugs methyl dopa, levodopa, etc ([www.anemiacause.html/www.anemia.html](http://www.anemiacause.html/www.anemia.html)). It can also result in some acute serious complications like blood clots, joint ache, headache, rashes allergic reaction, etc. Thus, it is a daunting task to ask all the persons to take iron tablets to prevent the occurrence of anemia considering the aforementioned ill effect of iron tablets. But, if it would be possible to determine whether any specific population is prone or resistant to anemia, it would rather be easy to suggest specific dietary advice to prevent the occurrence of anemia in such population.

Whereas blood group exhibits some relation with some

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**Table 1.** Result showing the frequency distribution of blood group among general non anemic population and anemic population.

Blood group	General population of local belt (%)	Anemic population of same belt (%)
A	22	28
B	38	42
AB	8	12
O	32	18
Rh+	94	94
Rh-	6	6

common diseases and if such relation is found existing between anemia and blood group, then it will become very easy to predict the type of population which is more prone or resistant to anemia and thus help us to recommend such population for taking preventive measure so that anemia can be eradicated in such population. So, the objective of the present study is to find out the existence of any correlation between blood group and anemia which may guide to recommend the appropriate preventive measures in preventing the occurrence of anemia in such population.

## MATERIALS AND METHODS

### Selection of subjects

For this study, 276 anemic patients of Haldia and Tamluk subdivision reporting to our associated Dr. B. C. Roy Hospital, Haldia were considered. The inclusion criteria of the anemic patients of both sexes was more than 18 years of age, non pregnant and premenopausal and hemoglobin concentration less than 12 g/dL in male and less than 10 g/dL in female. Patients of abnormal hemoglobin e.g. thalassemia and aplastic anemia, with acute and chronic infections, anemia due to blood loss or kidney problem, known alcoholism or cirrhosis of liver, regular (> 3 week) use of nonsteroidal antiinflammatory drugs (NSAIDs), known gastrointestinal or hematologic malignancy, etc. were excluded (Joharah, 2001) in this study.

### Collection of blood sample

With all aseptic precaution, the whole blood of suspected anemic patients was collected in fasting condition by venipuncture using disposable syringes. A portion of the blood was used for determination of red blood cell (RBC) count, hemoglobin concentration, and the remaining portion of the blood was used for the determination of blood group.

### Determination of total RBC count

The total erythrocyte count was done by hemocytometry using Neubauer's chamber with freshly prepared Hymes' diluting fluid (Ghai, 2007).

### Determination of hemoglobin concentration

The ethylenediaminetetraacetic acid (EDTA) mixed blood was

considered to determine the hemoglobin concentration (g/dL) by the Drabkin's Cyanomethemoglobin method (Cook, 1985). The criteria for detecting anemia were diagnosed as per WHO guidelines (WHO, 2001).

### Determination of blood group

The ABO blood group and Rhesus (Rh) factor of the anemic subjects were determined using the Tile or Slide testing method (Khattak et al., 2008) with the help of antisera-A, antisera-B and antisera-D and finally, the frequency of occurrence of anemia in relation to ABO blood group and Rh factor was assessed.

### Statistical analysis

As per the standard protocol, the result was expressed as percentage which is considered as frequency distribution of each ABO blood group and Rh factor. To establish the relationship in between the blood group and anemia, the frequency distribution (observed frequency) of blood group among the entire anemic population (N=276) was compared with those of general non anemic population (N=1026) by Chi Square test (Mahajon, 2006).

## RESULTS

In the present study, it is found that anemia is relatively prone to the individuals having blood group B, A or AB. It is also discovered that individuals with blood group O are comparatively resistant to anemia in spite of large frequency distribution of O groups in general population. Table 1 shows that the frequency distribution of O group is only 18% in anemic population, whereas it is far high (32%) in the general population. Statistical analysis by Chi square test reflects that the Chi square value at degree of freedom 3 is 10.18 which is far more than the 5% level of significance (0.05). Hence, the value is highly significant, that is, the frequency distribution of anemic group does not fit to the frequency distribution of non anemic general group or in otherwise, there is significant difference between the frequency distribution of anemic group and frequency distribution of non anemic general population. On the other hand, there is no such relationship between Rh factor and the occurrence of anemia is found between the above mentioned population.

## DISCUSSION

Anemia is a global problem and at its worst in developing countries. Though oral supplementation of iron and vitamin B12 and folic acid are most commonly used as a therapeutic measure to correct anemia; it is suggested that the oral supplementation of iron is not the best way to correct anemia (especially which are not due to iron deficiency) especially due to its adverse affect on some other body functions for which the patients sufferings becomes worst. Under this situation, it is far better to take

the preventive measure to combat anemia by taking iron or vitamin rich diet, especially to those who are more prone to anemia; though the type of such population is not known to us. On the other hand, blood group is one of the important and comparatively known parameter to the large number of present population which exhibits a strong correlation with some common diseases like cardiovascular diseases (WHO, 1993), gastric cancer (Jennings et al., 1956; Yeoh, 1960) and even HIV infection (Abdulazeez et al., 2008). This study is thereby an attempt to explore any relationship between blood group antigens and anemia considering the aforementioned facts. This study reveals that there is strong correlation between blood group and anemia. The individuals with blood group antigen alpha and beta are comparatively more prone to be anemic, whereas the individuals devoid of these antigens are resistant to anemia. So, it can be concluded that the regular intake of iron and vitamin rich diet in individuals having blood groups A, B, and AB can prevent the occurrence of anemia.

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