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Homozygotes for HbE and Anaemia -3 Years Study in Rajshahi

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Abstract

HbE is the most common abnormal hemoglobin of Southeast Asia and is almost limited to this region. It is estimated that 30 million people are heterozygous for HbE and that 1 million are homozygous. Aim of this study was to know the number of homozygous for haemoglobin E condition (Hb E disease) patients among patients suspected of having hereditary haemoglobin disorders referred to the regional laboratory, in Rajshahi.

From April 2009 to March 2012, anaemic patients suspected of having hereditary haemoglobin disorder (haemoglobinopathy or thalassemia) were referred to the divisional laboratory, Rajshahi for hemoglobin electrophoresis from the physicians of different areas of Rajshahi division and part of Khulna division. Patient's age ranging from 01 to 85 yrs of both sexes. Two to three milliliter blood was collected in tubes containing EDTA for complete blood count (CBC) and analysis of hemoglobin variants. CBC was measured by the Erma PC 604 particle counter. Peripheral blood film were examined after staining with Wright's stain.9 Hemoglobin electrophoresis was carried out on cellulose acetate using TEB buffer, pH 8.6.9.

Of 707 anaemic patients suspected of having hereditary haemoglobin disorder (haemoglobinopathy or thalassemia) 333 (47%) were abnormal. Of this abnormal patients 35 (11%) revealed a thalassemia-like disorder, 53 (17%) patients revealed haemglobin E disease, 46 (14%) patients haemglobin E trait and 188 (57%) patients having double heterozygous (Hb E/β thalassemia) disorder.

The birth incidence for homozygous babies and or Eβ thalassemia would be increases per year. Population groups with higher frequencies require screening programmes and facilities for antenatal diagnosis. Future comprehensive study are require to know the actual prevalence.

Keywords: Homozygotes for HbE and, Anaemia, Rajshahi.

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Introduction

HbE is the most common abnormal hemoglobin of Southeast Asia and is almost limited to this region. It is estimated that 30 million people are heterozygous for HbE and that 1 million are homozygous[1,6]. HbE is a thalassemic hemoglobinopathy since the nucleotide substitution G→A at codon 26 of the β gene changes the encoded amino acid (Lys→Glu) and creates a new alternative splice site in exon 1 [2,4]. This results in the synthesis of structurally abnormal variant hemoglobin HbE. Homozygotes for HbE are usually asymptomatic and have normal hemoglobin levels, but in some cases a mild anemia may be present. The peripheral blood smear shows microcytosis and 20 to 80% target red cells. Hemoglobin analysis reveals 85 to 95% of HbE with the remainder being HbF.

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WHO estimates that about 7% of world population is a carrier of a hemoglobin disorder and 3,00,000 to 5,00,000 children are born each year with the severe homozygous states of this diseases.[5] Bangladesh also lies in thalassemic belt. A world health organization (WHO) reports estimates that 3 % are carriers of β- thalassemia and 4 % are carriers of Hb-E in Bangladesh. There is no study showing the actual prevalence of Homozygotes for HbE in Rajshahi region. Birth rates of homozygous in different parts of the world have reduced considerably.

Control programs in Sardinia have substantially reduced the birth of homozygous thalassemics from 1:250 to as low as 1:4000 births.[10] It is essential to have a more accurate assessment of the gene frequency of hemoglobin E trait in the population for planning control programs for HbE heterozygotes and Homozygotes for HbE and Eβ-thalassemia in Bangladesh. The carriers themselves are healthy but in different combinations with β-thalassemia or with other abnormal hemoglobins, causes serous and emotional problem for patients and families, financial burden for national health services.

Aim & objectives

To know the number of homozygous for haemoglobin E condition (Hb E disease) among patients suspected of having hereditary haemoglobin disorders.

Materials & Methods

From April 2009 to March 2012, anaemic patients suspected of having hereditary haemoglobin disorder (haemoglobinopathy or thalassemia) were referred to the divisional laboratory in Rajshahi for hemoglobin electrophoresis from the physicians of different areas of Rajshahi division and part of Khulna division include Pabna, Natore, Nawgaon, Joypurhat, Chapinawabgong, Kustia, Meherpur, Bogra, Sirajgong and Chuadanga districts.. Patient's age ranging from 01 to 85 yrs of both sexes. Patients having age of less than 1 year excluded from this study. Two to three milliliter blood was collected in tubes containing EDTA for complete blood count (CBC) and analysis of hemoglobin variants. CBC was measured by the Erma PC 604 particle counter. Peripheral blood film were examined after staining with Wright's stain.[11] Hemoglobin electrophoresis was carried out on cellulose acetate using TEB buffer, pH 8.6.[11]

Results

Of 707 anaemic patients suspected of having hereditary haemoglobin disorder (haemoglobinopathy or thalassemia) 333 (47%) were abnormal. Of this abnormal patients 35 revealed a thalassemia-like disorder, 53 patients revealed haemglobin E disease, 46 patients haemglobin E trait and 188 patients having double heterozygous (Hb E/β thalassemia) disorder. Types of abnormal haemoglobin diagnosed are listed in table 4. The mixed thalassemia and abnormal haemoglobin are liste in table 5.

Table 1- Distributions of age of patients.

Age(yrs)	No. of case	%
1-15	227	68
16-30	59	17
31-85	47	15
Total	333	100

Table 2. Distributions of sex of patients.

Sex	No. of case
Male	334
Female	203
Total	537

Table 3**.** Investigations of abnormal haemoglobins and thalassemia.

Screening test	CBC, red cell indices, red cell morphology.
Specific test	Haemoglobin electrophoresis (cellulose acetate).

Table 4. Haemoglobin E disease and hemoglobins E trait.

Hemoglobin disorders	Patients
Hb E disease	53
Hb E trait	46
Total	99

Table 5- Distribution of patients with thalassemia and double heterozygous disorder.

Hemoglobin disorders	No.of case
Thalassemia	46
Double heterozygous	188
Total	234

Discussion

The primary objective of this study was to determine the number of Hemoglobin E disease in this regions of the country. The study was restricted to the anemic population those are referred for hemoglobin electrophoresis. Persons heterzygous for HbE appeared clinically well, with microcytosis and minimal anemia whereas the homozygous state produced the picture of a mild but notable microcytic anemia (mean hemoglobin level 10.5 grams/dl, MCV 69 cuμm)[7] with excess of target cells. Premarital screening is very useful for detecting carriers of hemoglobin E disease and double heterozygous conditions.

To our knowledge there is no study showing the actual prevalence of hemoglobin E disease in this region. The frequency of this disorder varies from country to country also regions.

In 2004, khan WA had carried out a study in school children and observed that the overall prevalence of hemoglobin E trait,in Bangladesh was 6.3 %.[8] In the neighboring country of Pakistan, the frequency of hemoglobin disorder has been reported to be 5.6%, which is similar to that observed in school children from Delhi with a largely Punjabi population[13]. Although antenatal diagnosis is central to the control of thalassemia and hemoglobinopathies. Several Mediterranean and western countries have achieved a significant change in the homozygote population since the last two decades.[14] Other countries which also have Thalassemia Control Programs include Canada, Israel, Turkey Thailand, Lebanon, West Bank and Gaza Strip, Malaysia, China, Iran, Egypt, and Pakistan.[15-24]

Populations to be screened include adolescents of high school/college for assessment of the Hemoglobin E trait status along with education and awareness of the disease, as well as pre- and post-marriage counseling. A 20-year-old study in high school children in Montreal, Canada, suggests that this is an effective strategy. [15] However, currently Iran has a thriving antenatal diagnostic program and births of homozygous thalassemics are considerably lower.[23] A highly successful campaign for the detection of hemoglobin E trait and prevention of the birth of Eβ-thalassemia or E disease babies in the isle of Menorca has resulted in the absence of the birth of even a single homozygote in the population.[25] Education and awareness regarding hemoglobinopathies and thalassemia need to be accelerated urgently among medical practitioners, paramedics, the thalassemic and general population to reduce the morbidity and mortality and the financial and socio-psychological burden of the thalassemic families.

Conclusion

The birth incidence for homozygous babies and or or Eβ thalassemia would be increases per year. This article describes the experience at one institution with this haemoglobinopathy and reviews some of the literature pertaining to the clinical, laboratory of this haematology abnormality. Future comprehensive study are require to know the actual prevalence. Population groups with higher frequencies require screening programmes and facilities for antenatal diagnosis.

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