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Transfusion-Transmitted Viruses in Individuals with β Thalassemia Major at Northeastern Iran, a Retrospective Sero-Epidemiological Survey

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Abstract

Background: Thalassemia syndromes are the most common genetic disorders in the world. They happen due to genetic defects in process of haemoglobin synthesis, and would be classified to many groups mainly α and β, based on the kind of defect. Anemia is the main clinical manifestation of this phenotype of disorder. In order to correct the chronic anemia in thalassaemic individuals, they may need to get 4-6 blood units per month. They are also prone to blood borne infections.

Patients and Methods: We retrospectively evaluated medical records of 360 major β- thlassemic patients in northeastern Iran to find the viral blood borne status among them.

Results: The findings showed that 209 (58.8%) were male and 151 (41.94%) were female. About blood borne viruses, 30 (8.33%) had positive result for anti-HCV. Eight persons (2.22%) had positive HBsAg. Twenty-two persons (6.11%) had positive HTLV-I serums. No one had positive HIV (1/2). Seven (1.94%) were positive for both HTLV-I and anti-HCV. Two ones (0.55%) had positive serums for both HTLV-I and HBsAg.

Conclusion: Similar to other geographic regions, the HCV was the most common type of viral infections in northeastern Iran. Surveying the HTLV-I, the northeastern part of country is one of endemic sources for the HTLV-I and in fact 22 individuals showed it. Also HBV had infected part of major β- thalassemic patients. Fortunately there was no case with the HIV that intensified the blood safety of blood transfusion organization.

Keywords: β-Thalassaemia major, HBV, HCV, HIV (1/2), HTLV-I.

Introduction

The term "Thalassaemia" indicates a heterogeneous group of genetic disorders in which the process of haemoglobin synthesis characterised by a disturbance of globin chain production, leading to anemia, ineffective erythropoiesis, and destruction of erythroblasts in bone marrow and erythrocytes in peripheral blood too. Based on the kind of globin chain that has been underwent reduction, it is classified to many groups mainly α and β. Thalassaemiae are among the most common genetic disorders in the world. These hereditary globin disorders has a wide distribution from Europe to south Asia, so it is found in all parts of the world, and the often used name “Mediterranean anemia” is misleading.

The α Thalassemia may be the most common single disorder in the world (the percentage of gene carriers in the middle east is 5-10%, 20-30% in west Africa, and up to 68% in the South Pacific), although the gene prevalence of north Europe and Japan is less than 1%. 2

The gene frequency of β- thalassemia more than 1% is seen in the Mediterranean basin, India, South Asia, North Africa, and Indonesia.3 In order to correct the chronic anemia in thalassaemic individuals (to maintain the pretransfusional haemoglobin concentration at 9 g/dl or higher), they need infusion of 4-6 blood units per month. The infection predisposing factors in thalassemic patients include severe anemia, iron overload, splenectomy, and a range of immune

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abnormalities.(4,5) In hematology patients, chronic transfusion regimes are frequent, and mostly related to agents transmitted via the blood products. In this retrospective study we analyzed medical documents of 360 major β-thalassaemic patients in north-eastern Iran to detect the prevalence of blood borne viruses and to compare it the with other geographic regions of Iran.

Participants and Methods

In order to perform this study, we analyzed medical records of 360 children with β-thalassaemia major that had been enrolled in Sarvar Clinic (related to Dr. Sheikh pediatric Hospital in Mashhad) during 2007. This clinic prepares medical services for individuals with thalassaemia and haemorrhagic disorders in north-eastern Iran. Some factors including: sex, age, blood group, anti-Hepatitis C Virus (HCV), Hepatitis B Surface Antigen (HBsAg), anti-Human Immunodeficiency Virus (HIV) 1/2 and anti-Human T Lymphotropic Virus type one (HTLV-I) antibody status for every child with β-thalassaemia major were recorded, Existence of Ig G antibody of HCV, HTLV-I and HIV 1/2 and HBsAg were tested via the third-generation of enzyme-linked immunosorbent assay (ELISA) based test kits and according to manufacturers' instructions (HBsAg kit by Biomeriex, Boxtel, Netherlands and HTLV-I, HIV1/2 and HCV kits by Dia. Pro Milano, Italy).

All of the current children are in continuous and regular contact with Sarvar Clinic. Results were obtained via the SPSS software, version 11.5 for windows (SPSS Inc, Chicago, IL).

Results

The obtained results showed that, out of 360 children with β-thalassemia major in north-eastern Iran, 209 (58.8%) were male and 151 (41.94%) were female. The youngest was 1 year old and the oldest 52 years old. The mean age was 11.64 ± 0.45 SD years. 93 ones (25.84%) had A+, 15 ones (4.16%) had A^-, 82 ones (22.77%) had B+, 9 ones (2.5%) had B^-, 31 (8.61%) had AB+, 2 ones (o.55%) had AB^-, 111 (30.84%) had O+ and 17 ones (4.73%) had O^- blood groups.

Regarding, blood borne viruses, 30 ones (8.33%) had positive result for anti-HCV. All these positive results had been confirmed using reverse transcriptase polymerase chain reaction (RT-PCR). Eight persons (2.22%) had positive HBsAg. Twenty-two persons (6.11%) had positive HTLV-I serums. No one had positive HIV (1, 2). Seven persons (1.94%) were positive for both HTLV-I and anti-HCV (co-infection). Two persons (0.55%) had positive serums for both HTLV-I and HbsAg (co-infection).

Discussion

Major β- thalassemic patients may need 4-6 bags of blood transfusion per month. This transfusion is able to directly transfer both microbial and viral infections to recipients.(1) Although in recent years, serious attempts have been done to screen donors before donation and detection of infectious viruses in blood products, but the risk of blood- born infection has not been deleted.

The geographic distribution of HCV is lowest in northern and Western Europe, the USA, and Australia and highest in Japan and the Middle East. The obtained results of our study showed that the HCV infection is the most common infection among major β- thalassemic children (8.33%). There are many reports about prevalence of HIV, anti-HCV, HBsAg in Iran 6-20 (Table 1), the highest prevalence of HCV in children with β-thalassaemia is related to Capital (Tehran), West (Shahre-Kord), Central (Ghazvin & Kerman) respectively and the lowest prevalence is seen in South-eastern (Zahedan), North-western (Azabayjan) and central provinces (Yazd & Markazi) respectively. The Importance of HCV infection will be greater because we don't have a vaccine against this virus. It becomes chronic in about 80% of those infected, irrespective onset. After many years, cirrhosis of liver may supervene in a minority of patients, but death due to this cause alone is rare. Even so, development of cirrhosis is sinister because it is often a precursor of hepatocellular carcinoma, which of course has a very poor prognosis.

Another important viral infection in studied individuals was the HTLV-I that was seen in about 22 persons (6.11%). Most persons infected with it, will remain asymptomatic in their lives, but in about 5%, overt diseases may appear after an incubation period of 10-40 years; having two distinct clinical manifestations, adult T-cell leukemia/lymphoma (ATLL) and HTLV-I-associated myelopathy (tropical spastic paraparesis). This virus is endemic in north-

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***Table 1**: The prevalence of blood borne viruses in individuals with thalassemia major at various geographic parts of Iran(Including results of the present study).*

Provinces	NO of individuals	Anti-HCV (NO/%)	HBsAg (NO/%)	HIV (NO/%)	HTLV-I(NO/%)	References
West (Shahre Kord)	113	26 (23%)	N	N	N	Basiratnia[6,7]
Central (Ghazvin)	95	23(24.2%)	1(1.1%)	N	N	Alavian[8]
South-East (Boushehr)	641	N	N	N	41 (6.38%)	Pourkarim[9]
Central (Kerman)	107	24(22.4%)	N	N	N	Vahidi[10]
Central (Hamedan)	53	18(34%)	0%	0%	N	Eghbali [11]
North (Ghaem Shahr)	100	18(18%)	N	N	N	Najafi [12]
Capital (Tehran)	175	N	N	N	11(6.3%)	Anaraki Mohamadi[13]
Capital (Tehran)	410	109 (27%)	N	N	N	Mirmomen[14]
South-East (Zahedan)	364	49(13.5%)	1(0.3%)	N	N	Sanei Moghadam[15]
North-West (Ardabil)	45	2(4%)	N	N	N	Barak[16]
Central (Yazd)	85	8(9.4%)	0(0%)	0(0%)	N	Javad Zadeh[17]
North-West (Eastern Azarbayejan)	84	6(7.1)	0(0%)	0(0%)	N	Torabi[18]
Central (Kerman)	100	11(11%)	6(6%)	0(0%)	N	Zahedi[19]
Central (Markazi)	54	5(9.2%)	4(7.4%)	0(0%)	N	Shariatzadeh [20]
South (Shiraz)	755	73 (15.7%)	4 (0.53%)	0(0%)	N	Karimi[21]
North-East (Khorasan)	**360**	**30 (8.33%)**	**8 (2.22%)**	**0 (0%)**	**22 (6.11%)**	**Mansouri (current study)**

N= not reported.

eastern Iran, therefore screening test is done for all donated blood bags in this province, but review of similar surveys showed that it is widespread in the south- east and centre of country as well.(9, 13) The risk of HTLV-I may be increased through the various geographic parts of our region and it is better that blood bank organization to pay more attention to screen the blood bags in other provinces and much exactitude over blood donation. Also it should be considered that there is no report of HTLV-I status in other provinces and it is better to carry out a survey to detect the possible existence of infection.

The HBV is dangerous because it be comes chronic, and elicits the liver cirrhosis or liver cancer. Occasionally, fulminant cases rapidly die due to massive liver failure. In our survey, eight children (2.22%) had positive results for the HBsAg. This shows that the HBV infection is less than the HCV's and comparing the other parts of our country; it was revealed that Markazi province in the center of country had most prevalence of HBV infection (7.4%) and the North-west (Azarbayjan) and Center (Hamedan) had least prevalence of infection (0%).

There are seven with both (HCV+HTLV-I) and two with (HTLV-I + HBsAg) infections. This shows that scrutinized detection of viruses is very important and transmission risk of more than one viral infection still exists. Existence of two infections in a case may aggravate both infections, and it is valuable to pursue clinical symptoms and signs of theses groups to discern possible variations in clinical findings and begin abrupt treatment.

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Although there was no HIV- infected person, but continuous unrelenting attempts must be done to prevent HIV transmission considering the serious complication of infection.

In regards to ABO blood groups of individuals with β-thalassaemia, the most common groups were, O+ (30.84%), A+ (25.84%) and B+ with (22.77%). These findings may be useful for blood transfusion organizations, and are similar to blood groups found among our geographic region population.

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