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Research Article

Frequency of Transfusion Transmitted Infections in B-Thalassemia Major Cases

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ABSTRACT

Objective: To determine the frequency of transfusion transmitted infections in β-thalassemia major cases.
Material and methods: This cross sectional study was conducted at Department of PediatricsNawaz Sharif Social Security Hospital, Lahore from September 2017 to March 2018. Total 211 cases of β-thalassemia major were selected transfusion transmitted infections were studied in these cases.
Results: Out of 211 patients, 60 (28%) were males and 151 (72%) were females. The incidence of transfusion transmitted infections increased with increased number of transfusions. 70 (33.1%) patients received between10-100 transfusions during study, 47 (29%) patients received between 101-200,60 (24.1%) patients had been transfused between 201-300 times, 25 (11.8%) between 301-400 and 12 (5.6%) patients had received more than 400 transfusions since the diagnosis of disease. 38.5% patient of 10-100 transfusion group, 55% of 201-300, 48% of 30-400 and 66.6% of more than 400 transfusion group were found seropositive for various viral markers in the study.
Conclusion: Thalassemia is a chronic transfusion dependent disease complicated by the effects of iron overload on various organs leading to increased morbidity and mortality. The risk of transmission of TTI in thalassemia increases with time as number of transfusions increase. The TTI further complements the suffering of patient leading to increased morbidity. Use of advanced technology in blood screening, voluntary donations, donor selection, asepsis during blood transfusion should be used to curtail the transmission.

Key words: Thalassemia, TTI, HBV, HCV, HIV

INTRODUCTION

Beta Thalassemia is a hereditary disorder which is characterized by deficiency in the synthesis of beta-globin chains of Hemoglobin. β thalassemia is caused by mutations in the HBB gene on chromosome 11 and is inherited in an autosomal recessive pattern. This mutation causes the inability to synthesize new Beta chains resulting in overall decrease in the production of Hemoglobin A. This decrease leads to the development of microcytic anemia which can be very severe and usually requiring long term transfusions for the patient to survive. These transfusions become a part of the disease as they can cause iron overload which in itself causes a lot of problems for the patients and chelation therapy is added to counteract the effects of this overload[1].

In β thalassemia major the mutated gene exists on both alleles. Other than anemia the patients are also predisposed to several complications. The excessive iron deposition effects the structure and function of the thyroid gland, this ultimately leads to hypothyroidism which is usually subclinical but can also manifest clinical symptoms[2]. It has been reported that these endocrinopathies occur in the second decade of life[3].

Adequate and safe blood transfusions with regular iron-chelation therapy remain the cornerstone therapy to improve the quality of life and survival of these patients.[4] If there is a breach in "safe blood transfusion" practices, these patients are confronted to new clinical challenges, particularly in the form of transfusion transmitted diseases, especially HCV (Hepatitis C Virus), HBV(Hepatitis B Virus) and HIV (Human Immunodeficiency Virus) infections.[5-6] Present study was planned to estimate the prevalence of transfusion transmitted viral diseases in multiple transfused patients of β-thalassemiaand factors affecting it.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Pediatrics Nawaz Sharif Social Security Hospital, Lahore from September 2017 to March 2018. Total 211 registered patients of β-thalassemia major who had been transfused at least ten units of blood and received complete course of hepatitis B vaccine) were selected. Patients receiving less than 10 transfusions or had received blood transfusion outside the institute were excluded from the study. Patients were given regular blood transfusions in order to maintain hemoglobin at least 10g/dl with chelation.

Blood units were screened for HIV, HCV, HBsAg, syphilis and malarial parasite. A detailed history and physical examination was done as per study performa. Complete hemogram with absolute platelets count, liver and renal function tests, serum ferritin levels and viral markers HIV, HBsAg (Hepatitis B surface antigen), HCV status were done at beginning of study and thereafter repeated every three months for 15 months. HbsAg in serum was analyzed using Microwell ELISA technique. HIV serological status was detected by Micro well ELISA test for detection of antibodies to HIV-1and HIV-2 in human serum/plasma. Third generation HCV microwell ELISA method was used for detection of antibodies against HCV in plasma.

All the collected data was entered in SPSS version 18 and analyzed. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data.

RESULTS

Out of 211 patients, 60 (28%) were males and 151 (72%) were females. (Fig. 1)Patients were divided into different age groups i.e. age group 0-5 years, age group 6-10 years, age group 11-15 years, age group 16-20 years, age group 21-25 years and age group >26 years. Total 44 (20.85%) patients belonged to age group 0-5 years followed by 60 (28.44%) patients to age group 6-10 years, 47 (22.27%) patients to 11-15 years age group, 35 (16.59%) patients to 16-20 years group, 19 (9%) patient to age group 21-25 years while 6 (2.84%) patients to age group >26 years. (Table 1)

Table 2 shows distribution of patients according to average number of blood transfusions. The incidence of transfusion transmitted infections increased with increased number of transfusions. 70 (33.1%) patients received between10-100 transfusions during study, 47 (29%) patients received between 101-200,60 (24.1%) patients had been transfused between 201-300 times, 25 (11.8%) between 301-400 and 12 (5.6%) patients had received more than 400 transfusions since the diagnosis of disease.

38.5% patient of 10-100 transfusion group, 55% of 201-300, 48% of 30-400 and 66.6% of more than 400 transfusion group were found

seropositive for various viral markers in the study (Table 2).

Fig. 1: Gender distribution of patients

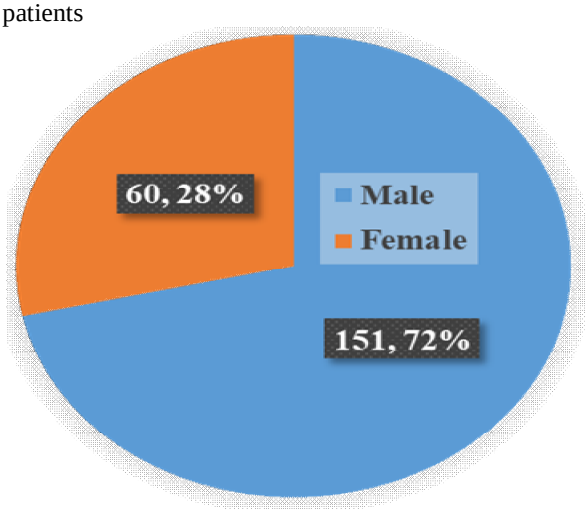

Table 1: Age distribution

Age (years)	N	%
0-5	44	20.85
6-10	60	28.44
11-15	47	22.27
16-20	35	16.59
21-25	19	9.00
>26	6	2.84
Total	**211**	**100**

Table 2: Distribution of patients according to number of transfusion received and prevalence of TTI in different groups.

No. of blood transfusions	Total no. of patients	Positive for HIV	Positive for HCV	Positive for HBV	Percentage of Seropositivity (%)
10-100	70 (33.1%)	0	26	1	27 (38.57%)
101-200	47 (29%)	0	0	0	0
201-300	60 (24.1%)	0	31	2	33 (55%)
301-400	25 (11.5%)	0	12	0	12 (48%)
>400	12 (5.6%)	0	6	2	8 (66.6%)

DISCUSSION

Transfusion transmitted infections (TTIs) are a great concern for safety of multiple transfusion patients. Themagnitude of the TTI varies from country to country depending on TTIs' loads in that particular population from where blood units are sourced.[5-6] The major problems are due to high prevalence of asymptomatic carriers in the society, blood donations during the window period of infections, concealing medical history by captive, paid, or professional blood donors who widely exist in developing countries. There is a long list of viruses, parasites, and bacteria, which can be transmitted through blood transfusions.[7-8]

HCV prevalence was found to be 35.54% in present study, making it most common TTIs. 55 males and 20 females were seropositive. In age group 0-5 years 4 patients out of 44, in age group 6-10 years 12 patients out of 60, in age group 11-15 years 25 patients out of 47, in age group 16-20 years 21 patients out of 35, in age group 21-25 years 9 patients out of 19, in age more than 26 years 4 patients out of 6 patients are found to

beseropositive for HCV. 2.36% patients were found to be HbsAg positive. 3 males. One male patient belongs to 0-5 year's age group and two male patients belong to 21-25 years age group, while there are two HBV seropositive females patients belonging to 11-15 years and more than 26 years age group each. None of the patient was found to seropositive for HIV, so its prevalence is 0%.

HCV is the most prevalent TTIs in all of the studies done earlier. Prevalence of HCV ranges from 2- 59.4 %. In present study it comes out 35.5% which is close to previous reports.[9-11] HBV prevalence in other studies is 0.75-20 %. In present study it is 2.3 %. HIV prevalence ranges from 0-9 % in various studies.[9-10]In present study no case was detected seropositive for HIV, making prevalence 0%.[12-13]

This high prevalence of HCV infection may be attributed to late starting of screening for HCV in donated blood bags compared to that of anti HIV-1/2.[5] HCV prevalence had shown a decreasing trend after mandatory screening of blood in blood banks. Another factor which might be responsible for high prevalence of HCV as compared to HBV is non-availability of vaccine against HCV.

During window period the HBsAg cannot be detected in the blood, although hepatitis B infection is present. Despite the screening of HBsAg by ELISA for over 20 years, transfusion associated HBV continues to be a major problem in India, more so in patients who receive repeated transfusions. During this "window period," detection of the antibody to the hepatitis B core antigen (anti-HBc) serves as a useful serological marker for hepatitis B infection. So there is a need of more advanced screening tests to limit the transmission of HBV infection.

Some countries with low level prevalence of HBV have implemented HBV NAT testing in plasma pools. The kinetics of viral antigen and antibody appearance during HBV infection create two different window periods in which one or the other test may fail. The "early acute phase", when serological markers are negative and "late chronic phase" when HBsAg may become gradually undetectable, although infectivity remains. NAT can potentially identify and therefore can be of particular benefit in detecting HBV DNA in latent HBV infection in early acute phase/occult HBV infection, when HBV DNA is present in plasma but presence of anti-HBC and HBsAg is variable.

The magnitude of the TTI varies from country to country depending on TTIs' loads in that particular population from where blood units are sourced. Multiple measures are taken to minimize TTI transmission in the respective population. These strategies may be targeted to prevent transfusion-transmitted diseases in that country. The strategies which may lead to significant decrease in TTI includes adequate screening of blood and blood products, use of advanced techniques like NAT (nucleic acid amplication techniques) which detects infections earlier than convention methods and reduces the the window period of HBV to 10.34 days, HCV to 1.34 days and HIV to 2.93 days.[14]

Promotion of voluntary donation in place of replacement donation of blood, selection of donors after proper history and examination, proper storage and handling of blood and blood products, use of adequate asepsis technique during transmission are some of the measures which can be taken for prevention of TTI.

CONCLUSION

Thalassemia is a chronic transfusion dependent disease complicated by the effects of iron overload on various organs leading to increased morbidity and mortality. The risk of transmission of TTI in thalassemia increases with time as number of transfusions increase.

The TTI further complements the suffering of patient leading to increased morbidity. Use of advanced technology in blood screening, voluntary donations, donor selection, asepsis

during blood transfusion should be used to curtail the transmission.

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