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ORIGINAL ARTICLE

The Analysis of Transfusion Transmitted Infections (TTIs) in Thalassemia Patients

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ABSTRACT

Objective: To find out the analysis of transfusion transmitted infections (TTIs) in β-thalassemia patients at a tertiary care hospital of South Punjab, Pakistan.

Study Design: A cross-sectional study.

Place and Duration of the Study: The Department of Hematological Disorder, Thalassemia and Bone Marrow Transplantation Centre, and Department of Biochemistry, "Bahawal Victoria Hospital, Quaid e Azam Medical College", Bahawalpur, Pakistan from February January 2020 to December 2021.

Methodology: Patients of blood transfusion-dependent *β*-thalassaemia of both genders and aged 5 to 12 years were analyzed. Blood was collected from patients aseptically and serum separated in Eppendorf tubes and stored at –20^{0}C. Screening for hepatitis C virus (HCV), hepatitis B virus (HBV), syphilis and human immunodeficiency virus (HIV) were performed through Chemiluminescence Immunoassay (CLIA) technique.

Results: In a total of 1212 patients, 745 (61.5%) were male. Overall, mean age was calculated to be 8.7±4.6 years while 874 (72.1%) patients were below 10 years of age. There were 866 (71.5%) patients who belonged to rural areas of residence. Parental consanguineous marriages were reported in 951 (78.5%) cases. There were 205 (16.9%) patients who were found to have TTIs. Out of these 205 patients, 169 (13.9%) were having HCV, 11 (0.9%) HBV, 20 (1.7%) syphilis whereas HIV was noted in 5 (0.4%) patients.

Conclusion: Prevalence of TTIs was found to be high among multi-transfused patients of β-thalassemia. Most common types of TTIs were HCV which is consistent to what has previously been reported in the local literature. Identification of HIV in 0.5% cases in the present study is pointing towards disturbing development regarding spread of HIV in our region.

Keywords: β-thalassemia, blood transfusion, hepatitis C, hepatitis B, human immunodeficiency virus.

INTRODUCTION

Thalassemia is the World's most common disorder of single gene, which is involved in the synthesis of hemoglobin chain.[1] It comprises of a group of hemolytic disorders where approximately 1.5 percent of the World population are considered to be beta thalassemia carriers.[2] Further, the number of new born thalassemia patients range between 50,000-60,000.[3] This disease is prevalent mostly in Mediterranean region, in South East Asia, Africa and Middle East.[4]

In Pakistan the prevalence of thalassemia is maximum among other genetic disorders. Its carrier form, also referred to as thalassemia minor prevails about 5 to 7 percent (8-10 Million) in Pakistan and the severe form of the disease; thalassemia major causes 100,000 patients in the country to suffer from thalassemia major. Unfortunately, this figure increases every year by 5000-9000.[5,6]

The management of thalassemia major mainly comprises of sufficient but safe transfusions of blood along with regular timed therapy for iron-chelation. Providing adequate treatment facilities for children suffering from thalassemia exceeds the resources available by the government.[7] Hence, the services of blood transfusion provided to thalassemia patients in Pakistan are quite fragmented, mainly because of increase in several forms of blood centers. It is estimated in a report that more than 1800 blood centers are functional in the country and private organizations dominate here.[8] So, the majority of thalassemia patients turn to NGOs who have insufficient resources and poor facilities. This poses severe challenge on the lives of these thalassemia patients in the form of transfusion transmitted infections (TTIs).

Most significant and lethal TTIs include Hepatitis C virus, Hepatitis B, HIV and syphilis.[9] The magnitude of TTI depends on the prevalence of a disease or an infection among the community involved in donating blood. In Pakistan the burden of infection causing liver cirrhosis have increased in the recent decades.[10] This study was conducted to find out the analysis of TTIs in β-thalassemia patients who turn to a tertiary care hospital, BVH, in Southern Punjab for blood transfusion.

METHODOLOGY

This cross-sectional study was done at "The Department of Hematological Disorder, Thalassemia and Bone Marrow Transplantation Centre, and Department of Biochemistry, Bahawal Victoria Hospital, Quaid e Azam Medical College", Bahawalpur, Pakistan from February January 2020 to December 2021. Approval from "Institution's Ethics Committee" was taken. Informed written consent was acquired from parents/guardians of all study participants at the time of enrollment.

A total of 1212 blood transfusion-dependent *β*-thalassaemia patients of both genders and aged 5 to 12 years were analyzed. All patients were receiving regular transfusions every month to aim hemoglobin level between 9 to 10 g/dl. All patients having other coexisting hemoglobinopathies were excluded. At the time of enrollment, gender, age and area of residence were noted. Blood was collected from patients aseptically and serum separated in Eppendorf tubes and stored at –20^{o}C. Screening for HIV, HBV, HCV and syphilis were performed through Chemiluminescence Immunoassay (CLIA) technique on Abbott ARCHITECT i2000 system. A special proforma was made to record all study data.

For data analysis, SPSS version 26.0 was used. Qualitative data was represented as frequency and percentages. Quantitative variables were shown as frequency and percentages. Study variables were compared between patients with and without TTIs applying chi-square test considering $p<0.05$ as statistically significant.

RESULTS

In a total of 1212 patients, 745 (61.5%) were male. Overall, mean age was calculated to be 8.7±4.6 years while 874 (72.1%) patients were below 10 years of age. There were 866 (71.5%) patients who belonged to rural areas of residence. Parental consanguineous marriages were reported in 951 (78.5%) cases. Table-1 is showing characteristics of all patients.

Table 1: Characteristics of Patients (n=1212)

Characteristics		Number (%)
Gender	Male	745 (61.5%)
	Female	467 (38.5%)
Age in Years	<10	874 (72.1%)
	≥ 10	338 (27.9%)
Area of Residence	Rural	866 (71.5%)
	Urban	346 (28.5%)
Parental Consanguineous Marriage	Yes	951 (78.5%)
	No	261 (21.5%)

In a total of 1212 patients, 205 (16.9%) were found to have TTIs. Out of these 205 patients, 169 (13.9%) were having HCV, 11 (0.9%) HBV, 20 (1.7%) syphilis whereas HIV was noted in 5 (0.4%) patients. Table-2 is showing comparison of characteristics of patients with respect to presence of TTIs. Gender (p=0.2084), area of residence (p=0.1482) or parental consanguineous marriage (p=0.0882) were not having significant association with TTIs but age above 10 years had significant association with TTIs (p<0.0001).

Table 2: Comparison of Patients Characteristics with respect to Presence of TTIs.

Characteristics		Transfusion Transmitted Infections		P-Value
		Yes (n=205)	No (n=1007)	
Gender	Male	134 (65.4%)	611 (60.7%)	0.2084
	Female	71 (34.6%)	396 (39.3%)	
Age in Years	<10	124 (60.5%)	750 (74.5%)	<0.0001
	≥ 10	81 (39.5%)	257 (25.5%)	
Area of Residence	Rural	155 (75.6%)	711 (70.6%)	0.1482
	Urban	50 (24.4%)	296 (29.4%)	
Parental Consanguineous Marriage	Yes	170 (82.9%)	781 (77.6%)	0.0882
	No	35 (17.1%)	226 (22.4%)	

DISCUSSION

The TTIs are considered to be an important health issue especially in the developing countries.[11] Patients of β-thalassemia are thought to be at increased risk for TTIs as these patients have regular transfusions but not many studies from Pakistan have been conducted to share the exact extent about the burden of TTIs in these patients. In this study, we noted 16.9% patients of β-thalassemia to have TTIs, out of which, 13.9% had HCV, 0.9% HBV, 1.7% syphilis and 0.4% HIV. The prevalence of TTIs in the present study is lower that what was noted by Al-Moshary M et al in a local study from three centers of Khayber Pakthunkhwa where they found prevalence of TTIs to be 29.9% while HCV was the most common types of TTIs revealed in 23.7%, HBV 4.9% and HIV in 1.4%.[12] Kiani RA et al reported prevalence of TTIs in β-thalassemia patients to be 25.3% which is higher than what we noted.[13] Some other studies have reported higher prevalence of HCV in β-thalassemia.[14-16] The present research is consistent in terms of HCV as the most common types of TTIs with other studies conducted in the past.[12-16] In this study, we noted that prevalence of HBV was only 0.9% which is way lower than 3% found by Al-Moshary M et al.[12] Literature reports prevalence of HBV between 1.5 to 2.4% among β-thalassemia patients which is higher than what we reported.[13,17] We noted HIV to be present in 0.4% cases while no data of β-thalassemia patients has been reported HIV cases from our region in the past which is quite surprising. Our findings correlated well with a previously conducted local study where the authors noted 0.5% patients of β-thalassemia to have HIV infections.[12] Others have revealed prevalence of HIV among patients of β-thalassemia to be between 0.7 to 17% which is showing great variability due to difference in characteristics and overall prevalence of HIV in the general population.[18,19]

In this study, 1.7% cases were positive for syphilis infections. Developed countries have shared very low prevalence of syphilis infections and it is being debated that whether it is justified or not to continue routine screening for syphilis in the blood donors.[20,21] The recent "World Health Organization" report showed that 13 countries are not able to screen 100% blood donations for at least 1 or more of the 4 key TTIs "(HIV, HBV, HCV and syphilis)" while 35 countries did not have required testing kits for TTIs at local or national level during the reported duration.[22]

Relatively less prevalence of TTIs in this study in comparison to others could be pointing towards improvement in screening of blood and blood products for infectious agents in our region but still lots of work is required to reduce the higher prevalence of TTIs among patients of β-thalassemia patients on regular blood transfusions. Developed countries have been using nucleic acid testing which is known to be a very sensitive approach to reduce window period but is not available in most centers of Pakistan due to cost issues.[23] As transfusion of blood is the main intervention required among patients of β-thalassemia for the proper management, there is a need to improve quality assurance of blood screening methods in order to guarantee safety of blood elements. As majority of the patients of thalassemia belong to rural areas in our area and they are being transfused regularly in the peripheral areas by NGOs or private settings where substandard screening blood transfusion methods are the main reasons for high prevalence of TTIs in these patients. Paid habitual blood donors are also threat regarding contribution to TTIs. Authorities and stack holders should take measures to ensure proper screening and safety of blood samples aiming reduction in overall prevalence of TTIs.

CONCLUSION

Prevalence of TTIs was found to be high among multi-transfused patients of β-thalassemia. Most common types of TTIs were HCV which is consistent to what has previously been reported in the local literature. Identification of HIV in 0.5% cases in the present study is pointing towards disturbing development regarding spread of HIV in our region.

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