Original Article

Prevalence of HIV, hepatitis B and hepatitis C infections among patients with thalassemia attending a tertiary care (rural) hospital

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Abstract

Introduction: The Sunderban area of West Bengal is home to tribal and religious minorities inhabiting various islands. There is a high prevalence of thalassemia among poverty-stricken residents of this region living with meagre health care facilities. This work was planned to determine the proportion of four viral transfusion-transmitted infections (TTIs): HIV-1, HIV-2, hepatitis B virus (HBV) and hepatitis C virus (HCV) among thalassemia patients attending the sole rural medical college in the region. **Materials and Methods:** Thalassemia patients (n = 359, age ranging from 1 year to 60 years) attending the thalassemia clinic or being admitted to the indoor facilities for better management were included in the study. Only patients diagnosed with high-performance liquid chromatography (HPLC) and with classical clinical features were included in the study. Blood samples of these patients were tested for HIV as per NACO protocol. For HBV and HCV, samples were first tested serologically; reactive samples were collected and sent in the cold chain to a higher centre for nucleic acid amplification testing (NAAT) for qualitative and quantitative estimation. Clinical and laboratory data was collected, patients were followed up for complications and hospitalisation during the study period, and statistical analysis was performed. **Results:** Majority of our patients had E-beta-thalassemia (245, 59.81%), followed by beta-thalassemia major (102, 28.30%). NAAT-confirmed HCV infection (14.21%) infection was the most common, followed by HBV (2.51%), and lastly by HIV-1 (0.58%) infection. Among infected thalassemia patients, the mean HCV RNA was 741063 ± 438514.67 IU/ml while the mean HBV DNA level was 4082863 ± 7298514 IU/ml. Co-infections of HIV-1 and HCV and that of HBV and HCV were noted in one patient each (0.28%). HCV-related liver disease (14.21%) and growth retardation (10.31%) were the most typical complication noted, and death occurred in five patients (1.39%) during the study period. **Conclusion:** Primary care physicians should know HCV infection is the most common TTI among thalassemia patients in rural eastern India.

Keywords: Hepatitis B virus, hepatitis C virus, HIV-1, thalassemia, transfusion-transmitted infection, viral load

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Introduction

The thalassemia is a group of anaemias that result from inherited defects in the production of haemoglobin. The thalassemia is among the most common genetic disorders worldwide,

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occurring more frequently in the Mediterranean region,[1] the Indian subcontinent, South East Asia and West Africa.[2] In India alone, 10,000-15000 cases are added every year.[3] The estimated incidence of pathological Hemoglobinopathies is 1.2 per 1000 live births in India, and a carrier frequency of 3-4% for beta-thalassemia trait has been noted[4], thus contributing to a significant health burden. Ineffective bone marrow erythropoiesis and red blood cell (RBC) haemolysis together account for the anaemia.[5]

Transfusion-transmitted infections (TTIs) are infections resulting from the introduction of a pathogen into a person through blood transfusion.[6] A wide variety of organisms, including bacteria, viruses, prions and parasites, can be transmitted through blood transfusion.[6] TTIs are significant problems for children suffering from β-thalassemia major as well as some other forms of Hemoglobinopathies. β-Thalassemia major and haemoglobin E/β-thalassemia are a result of various genetic defects leading to the deficient synthesis of the globin chain of haemoglobin.[2] There is severe anaemia, generalised fatigue, debility and growth retardation requiring frequent blood transfusions.[2] Repeated blood transfusion in high demand, poor testing and poor quality assured scenario invites many dangerous infections like HIV-1, HIV-2, HBV, HCV, etc.

There are no tertiary care medical facilities for around 47 hundred thousand people (as per the 2011 census) living in the Sunderban area (13 blocks in South 24-Parganas and 6 blocks in North 24-Parganas).[7] Our hospital is the nearest tertiary care hospital, about 17 kilometres from Kulpi/Kachuberia villages of the Sundarbans area.[8] The catchment area of our government tertiary care centre is home to tribal and religious minorities inhabiting various islands.[9] There are 52 inhabited islands in the Indian part of Sunderbans.[8] Population density is high and poverty is rampant in the Sundarbans Health District (SHD)[8] and Diamond Harbour Health Districts (DHHD) catered to by our hospital.[9] High burden of Hemoglobinopathies, especially E-beta-thalassemia, beta-thalassemia major and sickle cell disease, have been previously documented in eastern India and especially West Bengal.[10,11] High burden of disease leads to increased demand for blood transfusion, which is often by unscrupulous blood banks in the private sector and poor quality assured government centres. Till early 2021, no component separation facility was available in the DHHD and SHD. Thalassemia patients till then were forced to receive whole blood instead of packed RBCs.

This study was conducted among thalassemia patients (age ranging from 1 year to 60 years) attending our thalassemia day-care services, outpatient thalassemia clinic and admitted to the inpatient department. Many patients attend the clinic and utilise the government thalassemia day-care services and are admitted when they fall sick. The aim of our study is

(1) To detect TTIs (HIV seropositivity, hepatitis B virus infection and hepatitis C virus Antibody detection) in Thalassemia patients (aged 1 year to 60 years) attending our OPD and day-care services or admitted to Inpatient Departments.
(2) Quantitative detection of nucleic acid of hepatitis B and hepatitis C viruses among children suffering from thalassemia and infected with the respective viruses.

Material and Methods

Type of Study: Cross-sectional descriptive study.

Period of Study: 1 January 2021 to 30 June 2023

Inclusion Criteria: Patients diagnosed with thalassemia (age ranging from 1 year to 60 years) according to their medical history, clinical picture, complete blood count and high-performance liquid chromatography (HPLC) attending our thalassemia day-care services, outpatient thalassemia clinic and admitted to inpatient department.

Exclusion Criteria for observational study: (1) Thalassemia patients who do not give consent or assent and (2) thalassemia patients not belonging to the age group 1-60 years.

Sampling procedure and sample size: Convenient sampling was performed. The sample size was calculated to be 256, calculated by applying the formula of estimating proportion taking z = 1.96, *P* = 0.2 (estimating 20% of thalassemia infected would be infected with viral TTIs), q = 0.8, SD = 5% (0.05). At the end of the study period, 359 thalassemia patients could be included after consent/assent.

Human Subject Protection: This study was non-interventional, so there was no chance of harming human subjects. The identities of participants are not disclosed in this study.

Ethical Clearance and Consent of Participants: Researchers took consent or assent verbally and sent the patients and their parents (if age <18 years) to counsellors who filled out the consent/assent form and question sheet. The study proposal was approved by the Institutional Ethics Committee vide Approval Number DHGMC/2020/1105, dated 18 November 2020.

Statistical analysis was performed on spreadsheets using Microsoft Excel® and WHO Epi-Info Software version 7.2. A Chi-square test was performed to determine the significance of difference in proportions.

Estimation of Laboratory parameters:

1. Estimation of foetal haemoglobin (HbF) and adult haemoglobin (HbA and HbA2): Five (05) ml of peripheral venous blood was taken from each patient in an EDTA vial and mixed gently. HPLC was performed for each sample in the D10® instrument, and graphs were generated, analysed and reported as per National Thalassemia guidelines[3] by the researchers.
2. Detection of HIV and HBV infection and HCV serology status: Five (05) ml of peripheral venous blood was taken

from each patient in plain vial and allowed to stand in room temperature for 30 minutes and serum was separated. HIV-1 and HIV-2 were tested as per NACO guidelines for HIV infection.[12] For the enrolled cohort, HBsAg was tested using a direct sandwich ELISA (Hepalisa™, J Mita Pvt Ltd, Catalogue No. IR020096) and an immunochromatography-lateral flow assay (ICT-LFA) (HEPA™ CARD-P Series 100 Test, Reckon Diagnostic Pvt Ltd, Ref: RDT-HEC.73P, Mfg Lic No MFG/IVD/2022/000113). For all enrolled thalassemics, Anti-HCV antibodies were tested using both a third generation ELISA (thrid-generation anti-HCV MicrolisaTM, J Mitra Pvt Ltd, Catalogue No. HC023096) and an anti-HCV ICT-LFA (TRUST Line HCV Ab Rapid tst CAsettee, Athanese-Dx Pvt Ltd, Ref: AR0023C).

3. In patients showing reactive status for HBsAg and/or anti-HCV, 5 ml EDTA whole blood was again collected and kept at −80°C refrigerator. These aliquots were transferred to the NVHCP viral load testing centre (IPGMER, Kolkata) weekly with strict maintenance of the cold chain.[13,14] Viral load detection was performed using the Cobas® Quantitative nucleic acid test (HCV 96 test cassette, Ref: P/N: 06997732190) on the Cobas® 6800 analyser, Roche Diagnostics.
4. Haemoglobin %, Total RBC count, red blood cell parameters, total leucocyte count and platelet count during each patient's first diagnostic test at the hospital were recorded.

Clinical examination and Follow-up of patients during the period of the study: The thalassemia patients enrolled in the study were examined clinically during each visit to the hospital and followed up for the development of complications and any episode of hospitalisation due to illness during the entire 24-month period of the study.

Table 1: Baseline characteristics of study participants

Parameter	Number (%)
Age (in years)	
08-12 months	01 (0.28%)
1-3 years	12 (3.34%)
3-6 years	57 (15.88%)
6-10 years	74 (20.61%)
10-20 years	97 (27.02%)
20-30 years	81 (22.56%)
30-35 years	16 (4.21%)
35-40 years	7 (1.84%)
41-45 years	7 (1.84%)
>45 years	7 (1.84%)
Gender	
Male	193 (53.76%)
Female	166 (46.24%)
Religion	
Hinduism	210 (58.50%)
Islam	149 (41.50%)
Parent consanguinity	
Yes	03 (0.84%)
Degree of consanguinity	
First degree	00 (0.00%)
Second degree	01 (0.28%)
Third degree	02 (0.56%)
Total siblings	
Nil-02	216 (60.17%)
3-4	97 (27.02%)
5-6	36 (10.03%)
≤7	10 (2.79%)
Living siblings	
Nil-02	225 (62.67%)
3-4	99 (27.58%)
5-6	27 (7.52%)
≤7	08 (2.23%)
Blood transfusion status	
History of blood transfusion in past or at this visit	345 (96.10%)
No history of blood transfusion	14 (3.90%)

Results

The age, gender distribution, religion, marital status, history of consanguinity in parents, number of total and living siblings and blood transfusion status of the study participants are detailed in Table 1. Mean age of study participants was 16.17+/- 1.18 years (mean +/- 2SE). Mean number of total and living siblings 2.54+/- 0.17 and 2.35+/- 0.16. Of the 359 thalassemia patients, 193 (53.76%) were male and 166 (46.24%) were female.

Out of the 359 enrolled patients, the majority were diagnosed as beta-thalassemia major [102 (28.41%)] and E-beta-thalassemia [245 (68.25%)] [Table 2]. Uncommon diagnoses confirmed at the reference centre were HBS (sickle) beta-thalassemia [9 (2.51%)], and 1 (0.28%) each as sickle cell disease, complex thalassemia intermedia (beta trait with high foetal Hb and unknown variant), and complex thalassemia intermedia (HbD trait with high foetal Hb) [Table 2].

Table 2: Type of thalassemia and haemoglobin electrophoresis parameters according to HPLC pattern on D10 instrument

Type of Thalassemia	HbA %	HbA2%	HbF	Variant Hb [E/D/S]	Unknown variant
Beta-thalassemia major (*n*=102, 28.41%)	17.36±4.70	3.09±0.29	78.09±5.66	-	-
HbE-beta-thalassemia (*n*=246, 68.25%)	14.66±2.24	-	26.19±1.82	54.50±2.03	-
Sickle cell disease (*n*=1, 0.28%)	1.4	3.4	19.6	75.9	-
HBS beta-thalassemia (*n*=9, 2.51%)	11.82±15.37	5.23±0.51	20.50±9.42	64.31±13.54	-
Complex thalassemia intermedia (*n*=1, 0.28%)	71.7	5.2	15.5	-	7.7
Delta beta-thalassemia intermedia (*n*=1, 0.28%)	49.9	2.8	34.2	13.1	-

Legend to Table 2: Values mentioned as mean ± 2 standard error

Among our enrolled cohort, high HbF levels of 0.9%-4.0%, 4.1%-7.0%, 7.1%-10.0%, 10.1%-25.0%, 25.1%-50.0% and >75% were noted in 15 (4.18%), 11 (3.06%), 20 (5.57%), 92 (25.63%), 127 (33.38%) and 94 (26.18%) patients respectively. HbA2 levels were recorded as ≤4%, 4.0-7.0% and 7.0-8.5% in 323 (89.97%), 33 (9.19%) and 3 (0.84%) patients. HbE levels of 50%-60% and 60%-70% were found in 92 (25.63%) and 87 (24.23%) patients, respectively [Table 3]. Haemoglobin levels, total RBC count, total leucocyte count, red blood bell indices and platelet count at presentation among these thalassemia patients are noted in Table 4.

Major complications noted in these patients included growth retardation [37, 10.31%], cardiovascular disease [13, (3.62%)] and endocrine disorder [15, (4.18%)] [Table 5]. Five patients (1.39%) of our cohort died during the 24-month study period. Of the five deaths, three were due to cardiovascular complications (heart failure, 60%), one due to complicated hydrocephalus and HCV-related chronic liver disease (20%) and one due to advanced Acquired immunodeficiency syndrome (AIDS, 20%).

Sixty-two patients (17.27%) were seroreactive for HCV infection, of whom 51 patients (14.21%) were confirmed HCV-RNA positive. Nine patients (2.51%) were infected with HBV. Two patients (0.56%) were infected with HIV-1 infection [Table 6]. Our cohort include one patient (0.28%) each with dual viral infections of HBV and HCV and HIV-1 and HCV infection among the investigated TTIs. In HCV-infected thalassemia patients, the mean HCV RNA was 741063 ± 438514.67 IU/ml. Among HBV-infected thalassemia patients, the mean HBV DNA level was 4082863 ± 7298514 IU/ml [Table 6].

Table 3: Percentage of Haemoglobin eluting in the HPLC as HbF (F window), as HbA2, and HbE among the 359 enrolled patients

Parameter	Ranges	Number (%)
F window	0.9%-4.0%	15 (4.18%)
	4.1%-7.0%	11 (3.06%)
	7.1%-10.0%	20 (5.57%)
	10%-25%	92 (25.63%)
	25%-50%	127 (35.38%)
	>50%	94 (26.18%)
HbA2 levels	≤3.0%	305 (84.96%)
	3.1%-4.0%	18 (5.01%)
	4.1%-7.0%	33 (9.19%)
	7.1%-8.0%	3 (0.84%)
HbE levels	10%-20%	9 (2.51%)
	20%-30%	14 (3.90%)
	30%-40%	12 (3.34%)
	40%-50%	30 (8.36%)
	50%-60%	92 (25.91%)
	60%-70%	49 (13.65%)
	70%-80%	38 (10.58%)

Discussion

TTIs are dreaded consequence of transfusions. TTIs result in long-term morbidity and even mortality. In India, it is mandatory to screen donated blood for anti-HIV-1 and anti-HIV-2 (since 1991), anti-HCV (since 2000), HBsAg, syphilis and malaria.[12] Thalassemia major patients have a high risk of TTIs, mainly as a consequence of viral infections.[3,6,15-17] The probability of acquiring TTIs is related to the probability of being exposed to the infected blood. This probability depends on the prevalence of carriers among the blood donors in the population, the number of units transfused and the duration of transfusions. Thus, the infection rate of TTIs increases with age in subsequent years. The incidence of HIV infection in Indian children with thalassemia is high due to the high prevalence of HIV in the general population.[15] A higher incidence of TTIs in thalassemia has been associated with poor quality of life from developing countries.[16]

β-Thalassemia (whether major or intermediate) is the most clinically relevant hemoglobinopathy across India. A previous study has noted that in the eastern part of the country, HbE disease and E/β-thalassemia are also very common entities requiring clinical support.[9] A similar picture of high incidence of E/β-thalassemia was found in our study. Thalassemia major patients with severe symptomatic anaemia require regular and frequent blood transfusions from very early childhood. Many of the E/β-thalassemia patients and a few other patients with complex haemoglobin electrophoresis patterns actually had the thalassemia intermedia (TI) phenotype. In TI, the patient does not require a blood transfusion in the first few years of life and is able to survive into the second decade of life without chronic hypertransfusion therapy. Many such patients in our cohort have lived beyond the fifth decade of life but have required occasional blood transfusions during periods of crisis, surgeries and when decompensating due to common infections.

Table 4: Haemoglobin levels, total RBC count, total leucocyte count, red blood cell indices and platelet count at presentation among the 359 enrolled patients

Type of thalassemia	Total RBC count	Corrected WBC count	Platelet count	Haemoglobin%	MCV	MCHC	RDW-CV
Beta-thalassemia major (*n*=103)	2.89±0.21	6.93±0.44	231.05±33.57	6.15±0.39	73.67±1.70	30.61±0.58	28.05±1.60
HbE-beta-thalassemia (*n*=244)	3.29±0.12	6.91±0.23	302.18±29.66	6.15±0.20	65.21±1.08	29.20±0.27	29.87±0.74
Sickle cell disease (*n*=1)	2.41	5.3	151	7.1	88	33.6	20
HBS beta-thalassemia (*n*=9)	3.50±0.70	6.72±1.78	176.80±57.10	7.36±1.50	69.01±4.30	30.72±1.42	21.62±2.70
Complex thalassemia intermedia (*n*=1)	3.15	5.7	172	7.3	76.2	29.9	29.2
Delta beta-thalassemia intermedia (*n*=1)	5.41	5.7	215	11.7	79.9	31.8	17.1

Legend to Table 3: RBC=Red blood corpuscle, WBC=White blood corpuscle, MCV=Mean corpuscular volume, MCHC=Mean corpuscular haemoglobin concentration, RDW-CV=Red cell distribution width-covariance

During our study, we found HCV infection to be much more common among thalassemia patients than HBV, which was followed in incidence by HIV-1 infection. We did not find any patient with HIV-2 infection among the thalassemia patients. This is similar to the findings of other studies from developing countries.[16] Poor quality serological testing of anti-HCV is rampant in hospital practice and was noted in our hospital's central laboratory, too. This is because the routine ICT-LFA for anti-HCV antibodies has inherently low sensitivity and specificity. Even the ICT-LFA kit tests do not perform that well for the diagnosis of hepatitis B infection in comparison to ELISA (unpublished data). Only introducing routine ELISA for HBsAg and NAAT for HCV RNA in blood bank screening tests can reduce the magnitude of TTIs due to these hepatotoxic viruses.[12]

Table 5: Non-Infectious Complications noted and the number of deaths recorded during the study period among the enrolled patients (*n*=359)

Complications and Mortality Records	Number (%)
Complications	
Growth Retardation	37 (10.31%)
Cardiovascular Disease	13 (3.62%)
Endocrine Disorder	15 (4.18%)
Hepatitis C virus related chronic liver disease	51 (14.21%)
Hepatitis B virus related chronic liver disease	9 (2.51%)
Splenectomy done for Hypersplenism	06 (2.63%)
Chronic Renal Failure requiring Renal Replacement Therapy	01 (0.28%)
Pigment stone in Gall bladder on USG	02 (0.83%)
Polyarthritis	07 (1.95%)
Fractures	02 (0.56%)
Complicated Hydrocephalus	01 (0.28%)
Epilepsy	01 (0.28%)
Ankle Ulcers	02 (0.56%)
Paralysis, Cord Compression	01 (0.28%)
Acquired Immunodeficiency syndrome (AIDS)	02 (0.56%)
Hospitalization for serious illness	11 (3.06%)
Death	05 (1.39%)

When compared to statistics available through peer-reviewed studies from India,[15,16,18-33] incidence of HIV-1, HBV and HCV in our thalassemia cohort was on the higher side [Table 7]. Most recent reports from our country document the high prevalence of these TTIs due to the use of molecular tests in addition to serological tests like in our study [Table 7]. Our data also shows that prevalence in our thalassemic cohort of HIV-1, hepatitis B and hepatitis C was greater than in the general populace, as reported by national programmes.[12-14] As per NACO, HIV-1 incidence in general populace is 0.21%[12] while in our study population HIV incidence was 0.56%.

Our academic work recorded four deaths from our small cohort during the study period, indicating that the disease is a challenge to public health. The major causes of death were cardiovascular complications and AIDS. Cardiovascular complications are cited as a leading cause of mortality in thalassemia patients.[34]

Standard donor screening questionnaires and quality-assured laboratory tests help to reduce the risk of an infectious organism being transmitted by blood transfusion.[12] In addition, introduction of pathogen reduction technology (PRT) into routine practice may help further reduce the risk of TTs.[35,36] PRT involves treating

Table 6: Viral transfusion-transmitted infections (TTIs) recorded in enrolled patients

Name of viral transfusion-transmitted infections	Number (%)	Average viral load at diagnosis (mean±2SE)
HIV-1	02 (0.56%)	Not determined
HIV-2	Nil	-
Hepatitis C virus		
Serological test positive (ELISA and ICT-LFA)	62 (17.27%)	741063±438514.67 IU/ml
HCV RNA detected	51 (14.21%)	
Serology reactive, but HCV RNA not detected	10 (2.79%)	
HCV RNA below quantitative detection limit	16 (4.46%)	
10-2000 IU/ml	1 (0.28%)	
2000-10000 IU/ml	3 (0.84%)	
10001-100000 IU/ml	5 (1.39%)	
100001-1000000 IU/ml	19 (5.29%)	
>1000000 IU/ml	08 (2.23%)	
Hepatitis B virus		
Rapid ICT-LFA reactive	10 (2.79%)	4082863±7298514 IU/ml
HbsAg ELISA Reactive	9 (2.51%)	
HBV DNA detected	9 (2.51%)	
HBV DNA below quantitative detection limit	04 (1.39%)	
10-2000 IU/ml	01 (0.28%)	
2000-10000 IU/ml	03 (0.84%)	
>10000 IU/ml	01 (0.28%)	
Dual hepatitis B virus and hepatitis C virus infection	01 (0.28%)	-
Dual HIV-1 and hepatitis C virus infection	01 (0.28%)	-

Legends to Table 6: ELISA=Enzyme linked immunosorbent assay, LFA-ICT=Immunochromatography-lateral flow assay, IU/ml=International unit/ml

Table 7: Comparison of prevalence of tested TTIs with prevalence in general population

Prevalence in Thalassemia patients in other parts of India	Prevalence of viral TTI [Method tested]		
Area, Year, *n* [Reference]	HIV-1/HIV-2	HCV	HBV
North India, 2007, *n*=116[27]	-	58.9% [E]	0.00% [E]
Western India, 2011, *n*=200[22]	3% [E]	2% [E]	2% [E]
Western India, 2011, *n*=100[25]	9% [N]	18% [E]	6.00% [E]
Western India, 2012, *n*=96[16]	1.04% [E]	25% [E]	1.04% [E]
Western India, 2014, *n*=81[28]	1.23% [E]	16.04% [E]	2.46% [E]
North India, 2015, *n*=138[29]	0.72% [E]	13.04% [E]	0.00% [E]
Central India, 2015, *n*=66[21]	1.50% [E]	18.20% [E]	3.00% [E]
North India, 2016, *n*=211[24]	0.00% [E]	35.5% [E]	2.36% [E]
Western India, 2017, *n*=250[30]	0.40% [N]	-	-
Eastern India, 2016, *n*=1711[19]	3.74% [N]	18.70% [E]	3.33% [E]
Western India, 2017, *n*=300[33]	-	24% [E], 12% [M]	-
Eastern India, 2017, *n*=207[18]	-	24.6% [E]	3.38% [E]
North India, 2019, *n*=126[31]	0.00% [I, E]	13.4% [I, E]	0.79% [I, E]
Western India, 2020, *n*=196[15]	3.1% [E], 4.1% [M]	51.1% [E], 33.7% [M]	1.5% [E], 2.5% [M]
Eastern India, 2022, *n*=80[20]	7.50% [E]	-	-
Western India, 2023, *n*=150[26]	2.66% [E]	22.66% [E]	0.00%
Western India, 2023, *n*=222[32]	0.45% [N]	22.97%	2.25%
Eastern India, 2023, *n*=328[23]	1.80% [E]	34.5% [E]	4.50% [E]
Our Study, 2023, *n*=311	0.56% [N]	17.27% [I, E], 14.21% [E-M]	2.79% [I], 2.51% [E], [E-M]

Legends to Table 7: *n*=number of patients tested, [E]= reactive in ELISA methodology, [M]= positive in PCR test, [N]= HIV detection as per NACO guidelines, [I]= Reactive in Immunochromatography test (ICT), [I, E]= Reactive in both ICT and ELISA test, [E-M]= reactive ELISA followed positive PCR detection

certain blood products with a pathogen-inactivating agent soon after collection. PRT may also eliminate the need for irradiation to prevent transfusion-associated graft versus host disease and serologic testing for CMV for at-risk patients. The introduction of PRT is the need of the hour in resource-poor settings where pre-transfusion screening is often compromised in the scenario of high demand, suboptimal testing and poor quality assurance of testing.[36]

Conclusion

Our study suggests that in this particular rural setting, high incidence of thalassemia and blood-borne infections and lack of pre-transfusion quality assured testing in the blood banks have resulted in a high incidence of TTIs, especially HCV infections. There is a great need to enhance quality assured infectious disease screening of blood donation, transfusion and blood products.

Recommendation

1. Government-aided nucleic acid amplification tests for HCV, HBV, HIV1,2 and haemoglobin electrophoresis should be available at all blood transfusion centres and district and subdivision hospitals.

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Conflicts of interest

There are no conflicts of interest.

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