ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 10 | October - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PREVALENCE OF HEPATITIS B VIRUS AND/OR HEPATITIS C VIRUS INFECTION IN THALASSEMIA PATIENTS WITH HISTORY OF REPEATED BLOOD TRANSFUSION IN A TERTIARY CARE HOSPITAL

Microbiology

Dr. Soma Bose Assistant professor , Microbiology , Calcutta National Medical College & Hospital.

Dr. Sabina Yeasmin Research Scholar, Calcutta National Medical College & Hospital.

Dr. Rameez Yusuf* Junior Resident,microbiology , Calcutta National Medical College & Hospital. *Corresponding Author

Dr. Indrani Bhattacharyya Professor, Microbiology, , Calcutta National Medical College & Hospital.

ABSTRACT

INTRODUCTION:- Thalassemia is an autosomal recessive disorder that causes haemolytic anaemia. Repeated blood transfusion is not generally safe if the transfused blood not screened properly for the following viruses Hepatitis B(HBV), Hepatitis C(HCV) and Human Immunodeficiency Viruses(HIV) could transmit those blood borne viral diseases following transfusion . The main aim of this study is to access the prevalence of HBV, HCV or both in repeatedly transfused thalassemia patients.

MATERIAL & METHODS:- The study was conducted in serology section under Microbiology department , Calcutta National Medical College & Hospital KOLKATA , amongst thalassemia patients who have already received multiple blood transfusions > 5, who were tested for HBV, HCV by immuno chromatography and followed by confirmation with ELISA.

RESULTS:- Out of 780 patients % of HBV positive, HCV positive and co infection cases are 12%, 23% and 2% respectively.

DISCUSSION:- The HbsAg positive ratio between male and female candidates in age groups 5-11, 12-15, & overall age groups are (1.9:1), (1.66:1) and (1.18:1) respectively. HCV positive male and female amongst 5-11, 12-15, & overall age groups are (2.28:1) , 1.3:1 & 1.9:1. Both positive candidates for HBV, HCV infections between the same age group are 3:1 respectively.

CONCLUSION:- The percentage of HCV infected patients is almost double than that of HBV infected ones. Explanation could be an efficient recombinant vaccine for HBV is available where as for HCV yet now there is none.

KEYWORDS

Thalassemia, Hepatitis B, Hepatitis C, blood transfusion, recombinant vaccine, autosomal recessive.

INTRODUCTION:

Thalassemia is very common autosomal recessive genetic disorder that causes severe haemolytic anaemia in homozygous form (Thalaseemia major) with early morbidity and mortality [1]. Most patients require repeated blood transfusion for survival. But if the blood is not screened properly before transfusion then different transfusion transmitted viral infections like Hepatitis C , Human immunodeficiency virus, hepatitis B & hepatitis G may be transmitted [2] , [3]. So donor screening is essential before blood transfusion [4]. On the basis of worldwide data WHO reported approximately 240 and 150 million people are infected by HBV & HCV virus & 15 million people have clinically apparent thalassemia disorders World wide 0.3-5.7% thalaseemia patient have infected with HBV . In different reports in India it was found that amongst the thalassemics 1% to 64% patients are infected with Hepatitis B . The prevalence of HepatitisC amongst thalaseemia patients in India ranged form 7% to 25 % .[1],[5].

Beta thalassemia due to anomalies in the synthesis of Beta chains of haemoglobin is the major type of thalaseemia . . In India almost 30 million people carry thalassemia. Major prevalence of thalaseemia seen in Mediterranean countries , central Asia, Middle east, India , Southern china, Southern America & along the North cost of Africa.[6].

Treatment of Thalaseemia includes regular RBC or blood transfusion , iron chelation & management of secondary complications due to iron overload . Transfusion considered on the basis of severe anaemia (Hb < 7gm /dl) for 2weeks , Correction of Hb level 9.5 to 10 gm/dl prevents growth retardation, organ damage ,bone deformities ,allow the child to lead a normal life .[6,710,]

Inhibition of gastro intestinal iron absorption, suppression of erythropoiesis are main goals of transfusion therapy.[8,9]

Following repeated transfusions these patients are exposed to various complications apart from iron toxicity like hypersplenism, venous thrombosis & osteoporosis, but also by new clinical challenges, particularly in the form of transfusion transmitted infections, especially hepatitis B virus (HBV), hepatitis C Virus (HCV) & human immuno deficiency virus (HIV) Infections if the blood or blood products are not properly screened before transfusion [6,8].

Post transfusion viral hepatitis increased risk of hepatocellular carcinoma in Thalaseemia patients [6,8].

Hepatitis C virus (HCV) is included in the family Flaviridea of genus Hepacivirus & a hepatotrophic Single stranded (ssRNA) virus .Approximately 180 million people worldwide are infected with Hepatitis C virus & around 2% people are infected each year.

Hepatitis C genome has high rate of mutation due to its high replicative activity . HCV has 6 major genotypes differ from each other by 31-33% in their RNA sequence , In India genotypes 1 & 3 are most prevalent . Each genotypes are further subdivided into more than 100 subtypes . Within a single patient several subtypes circulate as closely related viral population known as quasispecies . Due to high rates of mutation & presence of different subtypes in a single patient (quasispecies) at a time there is still no effective vaccine against it. [9,10]

Hepatitis B is the only DNA virus in the family Hepadnaviridae , mutations in various genes of HBV leads to emergence of mutant strains . Two types of mutants are identified precore mutants & escape mutants (where mutation in S – gene leads to alteration of HBsAg ,results to vaccine failure. [15,18].

Due to high chronicity of HCV than HBV, serious diver diseases are seen more in HCV patients [8,9]. Both HBV & HCV blood transfusion , parenteral drug therapy ,needle stick injury are the most common routes of transmission. HBV can be transmitted as little as 0.0001 ml of blood but chance of transmission of HBV following a contaminated needle stick injury is nearly 30% as compared to 3% & 0.3% with HCV & HIV respectively . HBV has eight genotypes (A-H) .Genotype A & D are most prevalent in India ,only in Eastern parts of India HBV genotype C is also prevalent.[9]

60-70% of HCV patients may progress to chronic hepatic disorders like cirrhosis, hepatocellular carcinoma and chronic hepatitis [6,8] whereas 90-95% patients with hepatitis B have self recovery only5%

HBV cases may progress to chronic hepatitis with cirrhosis & Hepatocellular carcinoma . In India prevalence of HBsAg 2% to 8% in HBV endemic zone and about 50 million HBV carrier present in this country.

In the last decade, HCV has become one of the major infecting organism in multiple transfused patients with thalassemia, with increase in the number of transfusions the rate of positivity increases , As no vaccine is yet now available against HCV only way to prevent it by safe transfusion with proper screening of donors & blood products. .

AIMS & OBJECTIVES:

The aim of this study is to determine the prevalence of hepatitis B Virus, hepatitis C Virus & coinfection in multiple transfused thalassemia patients. By performing this study we can raise an awareness amongst pathologist , microbiologist & particularly haematologist to pay great attention towards prevention of these two Hepatitis following transfusion .

HBV already has an effective vaccine against it. On the other hand because of the numerous variation of HCV including its clades, no vaccine has yet been commercialized. Hence in a country like India millions of people living lying below poverty line it is always wise to identify the problem by proper screening of the blood to be transfused. Thus finally the aim is to prevent these infections all together.

MATERIALS & METHODS:-

The hospital based study was conducted in the Department of Microbiology, Calcutta National Medical College & Hospital, Kolkata. HBsAg (Hepatitis B Surface Antigen) & Anti HCV(Hepatitis C) antibody were tested in 780 patients thalaseemia patients, each have received at least 8 transfusions. Screening was done by immunochromatography methods (HEPA – SCAN, HCV CARD TEST ,Bhat- Biotech , Hepatitis B – Card / Angstorm Biotech Pvt Ltd ,) and confirmed by using enzyme linked immunosorbent assay (ELISA).[HBs ELISA TEST HEPA- SCAN , HCV ELISA TEST HEPA-SCAN ,BHAT BIO TECH INDIA (P) LTD.

RESULTS :

Out of 780 patients, 96 patients were found HbSAg positive and & 180 patients were found anti HCV antibody positive and 16 patients were found both positive. Male: female ratio among the HbSAg positive patients was 1.18:1 and among the anti HCV antibody positive patients it was 1.9:1.Patients aged between 5-11 years were mostly affected. Hepatosplenomegaly and increased liver enzymes (AST, ALT) were found among 60% of the affected patients..

DATA ANALYSIS :

1. Total no of thalassemia patients tested – 780
2. No of HbsAg positive cases – 96 (12%)
3. No of antiHCVAb positive cases – 180 (23%)
4. No of both HbsAg & antiHCV Ab positive cases – 16 (2%)

AGE WISE DISTRIBUTION OF HBsAg , Anti HCV , BOTH POSITIVE PATIENTS

- No of patients aged between 5-11 years found HbsAg positive - 64
- No of patients aged between 5-11 years found Anti HCV positive – 125
- No of patients aged between 5-11 years found both HbsAg and AntiHCV positive - 12
- No of patients aged between 12-15 years found HbsAg positive – 32
- No of patients aged between 12-15 years found HCV positive – 55
- No of patients aged between 12-15 years found both HbsAg and Anti HCV positive – 4

So, prevalence of Hepatitis B, Hepatitis C and both virus infections are more common 5-11years age group than 12-15 years age group.

SEX WISE DISTRIBUTION OF HBsAg , AntiHCV Antibody & BOTH POSITIVE PATIENTS :

No of male found HbsAg positive 62 No of female found HbsAg positive 34
Male : Female : 1.8: 1
No of male found Anti HCV positive – 118 No of female found Anti HCV positive – 62
Male: Female : 1.9:1
No of male found both HbsAg & AntiHCV positive – 12 No of female found both HbsAg & HCV positive- 4
Male: Female: 3:1
So the prevalence of Hapatitis B , Hepatitis C & Both positive cases are found to be more in Male than Female.

Charts & Tables in a separate page

DISCUSSION

Transfusion- Transmitted infections with HBV, HCV, HIV are dreaded threats of long-term mortality and morbidity in multiple transfused patients with thalassemia[1]. In India it is mandatory to screen donated blood for HIV, (Since 1996), anti-HCV (Since 2001) & HBsAg (Since 1996), Syphilis & malaria. Generally ICT based assays & ELISA based assays are used by most of the blood banks for screening. But some times even with ELISA some asymptomatic donors in 'Window period' of HBV could be missed (Window period- In early infection period when immunological test is non-reactive without expression of HBsAg).[12]

Also in Occult HBV (absence of HBsAg in serum but presence of HBV DNA in liver tissues or blood) may be missed by traditional ICT Kit.[13] So NAAT based (detection of Nucleic Acid) screening has increased the accuracy of detection in case the patient is in window period.[14]

Alternatively most accurate test to detect HCV is RIBA (Recombinant immuno blot techniques). But unfortunately these expensive Nucleic acid based assays are difficult to implement in developing country. [16]

Not only lab based screening but also donor selection criteria with proper history taking is also important. Rejecting high risk donors with H/O chronic liver disease, jaundice, IV drug abusers, multiple sexual partners, will definitely reduce the burden of Infection. [12]o

In our study the HbsAg prevalence was much lower than that of anti HCV positive amongst the thalassemics.

Similar results were found in studies in Jorden & Iran with measured HBV & HCV prevalence being 1.5% & 3.5% respectively.[1]

Reason could be presence of a good recombinant vaccine against HBV reduces the prevalence whereas HCV yet now no proper vaccines are available. More over widespread vaccination of adults & introduction of HBV vaccine in National Immunisation schedule with a good sero conversion post vaccination could be the fact of low incidence. It is better to administer at least two doses of vaccine to all newly diagnosed thalassemics before transfusion.[14]

The rate of infection found to be higher in multi transfused thalassemics indicate that receiving multiple transfusion for long period might cause immunomodulation resulting in susceptibility to infections [12].

In advanced cases of post splenectomised thalassemia with increased risk of iron overload makes them susceptible to repeated infections.[17]

The risk of post transfusion HBV, HCV or co-infection increases the long term of dreaded complications like hepatocellular CA or cirrhosis.

The foremost need of safe transfusion practices by proper donor screening (with most sensitive NAAT based assays), awareness of safe transfusion by wide spread coverage of vaccination against HBV & excluding high risk donors for transfusions can be the alternate goal to reduce the burden of transfusion-transmitted infections & the risk of complications in multiple-transfused thalassemic patients.

CONCLUSION :

Thalassemia patients are extremely vulnerable to HBV and HCV infections. As mentioned in study by K. Mukherjee et al. from NRSMCH Kolkata and Liqaa Mohammed Al Sharifi et al. from Babylon university, Iraq ,the percentage of thalassemics infected with HCV is definitely on the rise and has surpassed HBV infection rates.[19] This could be because HBV can be prevented by an efficient vaccine available worldwide. Vaccine against HCV is not available yet

and prevention depends only on proper screening. Stringent measures should be taken while screening blood for hepatitis B surface antigen (HbsAg) and anti hepatitis C antibody (Anti HCV antibody). HBV vaccine should be made available to all thalassemics patients .

MALE AND FEMALE COMPARISON FOR HbSAg IN THALASSEMIA PATIENTS

AGE IN YEARS	MALE	FEMALE	M:F
<12(5-11)	42	22	1.9:1
12-15	20	12	1.66:1
TOTAL	62	34	1.18:1

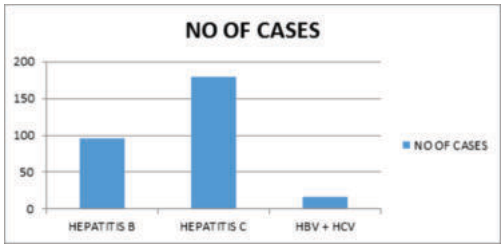
MALE AND FEMALE COMPARISON FOR ANTI HCV ANTIBODY IN THALASSEMIA PATIENTS

AGE IN YEARS	MALE	FEMALE	M:F
<12 (5-11)	87	38	2.28:1
12-15	91	24	1.3:1
TOTAL	168	62	1.9:1

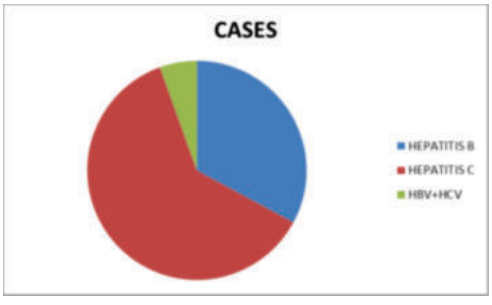
MALE AND FEMALE COMPARISON FOR HbSAg &ANTI HCV BOTH IN THALASSEMIA PATIENTS

AGE IN YEARS	MALE	FEMALE	M:F
<12 (5-11)	9	3	3:1
12-15	3	1	3:1
TOTAL	12	4	3:1

THE FOLLOWING BAR DIAGRAM & PIE CHART SHOWING TOTAL NO OF HBsAg , Anti HCV Antibody & BOTH POSITIVE CASES

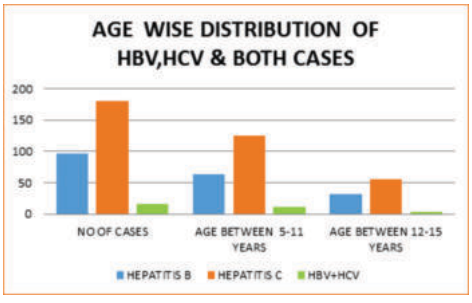


Total No Of
Hepatitis B 96
Hepatitis C 180
Co infection 16

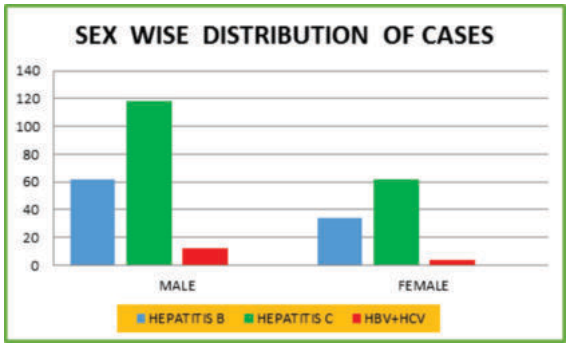


INFERENCE : NUMBER OF HEPATITIS C CASES ARE MORE THAN HBsAg & CO INFECTION

The following Bar Diagram Showing Highest No of cases between 5-11 yrs of age group



THE FOLLOWING BAR DIAGRAM SHOWING SEX WISE DISTRIBUTION OF HEPATITIS B , HEPATITIS C & BOTH POSITIVE CASES



Showing Males are more affected than females in all types of infection

REFERENCES :

1) Shivani Satia, Manoj Jais and Madhumita Debbarma, Seroprevalence of Hepatitis B and Hepatitis C among thalassemia patients at a tertiary care hospital in north india, european journal of pharmaceutical and medical research, 2016,3(8), 608-611
2) Ahmed Kamel Mansour,a Rabab Mahfouz Aly. Prevalence of HBV and HCV infection among multi-transfused Egyptian thalassemic patients. Hematol Oncol Stem Cell Ther., 2012; 5(1): 54-59.
3). Hamid H, Rashid I, Muhammad HK, Bushra I, Sabina A, Fayaz KB, Junaid S, Mumtaz H, Yasir BN, Jai K. Prevalence Of Hepatitis C In Beta Thalassaemia Major. Gomal Journal Of Medical Sciences., 2008; 6(2). p
4). Alavian SM, Tabatabaei SV, Lankarani KB. Epidemiology of HCV Infection among Thalassemia Patients in Eastern Mediterranean Countries:A Quantitative Review of Literature Iran. Red.Crescent. Med. J., 2010; 12(4): 365-376.
5). Hardik B., Kanu P. Prevalence of HIV, Hepatitis B and Hepatitis C infection in Thalassemia major patients in tertiary care hospital. NJIRM., 2011; 2(3): 975-984.
6) Kheya Mukherjee, Debojyoti Bhattacharjee , Goutam Chakraborti, Prevalence of hepatitis B and hepatitis C virus infection in repeatedly transfused thalassemics in a tertiary care hospital in eastern India, International Journal of Research in Medical Scienc 2017 Oct;5(10):4558-4562
7). Flint J, Harding RM, Boyce AJ, Clegg JB. The population genetics of the hemoglobinopathies. Bailliere's Clin Haematol. 1998;11:1-50.
8). Prati D., Benefits and complications of regular blood transfusion in patients with beta-thalassemia major. Vox-Sang. 2000;79(3):129-37.
9) Mollah AH, Nahar N, Siddique MA, Anwar KS, Hassan T, Azam MG. Common transfusion transmitted infectious agents among thalassemic children in Bangladesh. J Health Popul Nutr. 2003;21(1):67-71.
10). Simmonds P, Alberti A, Alter HJ, Bonino F, Bradley DW, Brechot C, et al. A proposed system for the nomenclature of Hepatitis C viral genotypes. Hepatol. 1994;19:1321-1324.
11) Thalassemia International Federation: Guidelines for the clinical management thalassemia. 2nd edition. 2008.
12) Bhuniya et al, frequency of hepatitis b, c and hiv infections amongtransfusion-dependent beta thalassemia patients in Dhaka, Infect.Dis. Rep. 2021, 13, 89– 95, https://doi.org/10.3390/idr13010011
13) Laperche, S. Francophone African Group for Research in Blood Transfusion Multinational assessment of blood-borne virus testing and transfusion safety on the African continent. Transfusion 2013, 53, 816–826.
14) Keechilot, C.S.; Shenoy, V.; Kumar, A.; Biswas, L.; Vijayrajratnam, S.; Dinesh, K.; Nair, P. Detection of occult hepatitis B and window period infection among blood donors by individual donation nucleic acid testing in a tertiary care center in South India.Pathog. Glob. Health 2016, 110, 287–291
15) Sibnarayan Datta. An overview of molecular epidemiology of hepatitis B virus (HBV) in India. Virol J. 2008;5:156.
16) Ahmed, M.U.; Begum, H.A.; Hossain, T.; Chakraborty, P. Incidence of Common Transfusion Transmitted Diseases among BloodDonors. J. Armed Forces Med. Coll. Bangladesh 2009, 5, 4–6.
17) Choudhry, V.P. Hepatitis B and C Infections in Multitransfused Thalassemic Patients. Indian J. Pediatr. 2015, 82, 212–214.
18) Jameson, Fauci, Kasper, Hauser, Longo, Loscalzo, Acute viral hepatitis. Harrison Principles of Internal Medicine, 2020; 20: 2353-2364
19) Mohammed A. Muhsin Iman Fadhil Abdul-Husin. Seroprevalence of Hepatitis B and C among Thalassemic, Haemophilic patients in Babylon Governorate-Iraq Medical Journal of Babylon., 2013; 10(2).