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The burden estimation of hepatitis B & C in thalassemia patients in MGM Medical College and Hospital, Jamshedpur

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***Abstract*---**Introduction: Thalassemia encompasses a group of genetic blood disorders, in which there is altered or inadequate haemoglobin synthesis and requires a repeated blood transfusion. Due to repeated blood transfusion, these patients are vulnerable to HCV, HBV, and HIV like blood transfusion transmitted diseases. Aims and Objective: To determine the prevalence of HCV and HBV infections in multitransfused thalassemia patients in a tertiary care hospital. Material And Methods: Cross sectional and observational studywas done on a total of 110 beta thalassemia patients aged between 2-25years &were categorised into four groups (2-7 years, group 1; 8-13 years, group 2; 14-19 years, group 3 and 20-25 years, group 4).For testing, 5 ml Blood sample was collected, Serum separatedand subjected to testing for HBsAg, and antibody to Hepatitis C, by ELISA method. Screening was done by immunochromatography test (point of care test). Results: A total of 110 patients of beta thalassemia major were included in our study. Out of this, 68(62%) were males and 42(38%) were females. In our study, out of the 110 thalassemia patients, 19(17%) patients were HCV reactive, 6(5.5%) were HBV reactive and 3(2.75%) were both HCV and HBV reactive. Out of 68 male thalassemia patients, 11 are HCV, 4 are HBV and 02 are both HCV and HBV reactive. Out of 42 female thalassemia patients, 08 are HCV, 02 are HBV and 01 are both HCV and HBV reactive. Conclusion:

Donor Blood screening to be done by using standard ELISA kits and Nucleic Acid Amplification testingto be made available in blood Banks. To create awareness about hepatitis B vaccination. Genetic counselling is indicated to create awareness and prevent thalassemia major in subsequent offspring.

***Keywords*---**Hepatitis B & C, Thalassemia, ELISA nucleic acid Amplification testing.

Introduction

Haemoglobin is made of 2 proteins, alpha globin and beta globin. Thalassemia occurs when there is a defect in the production of either protein.Both alpha and beta thalassemia includes the following two forms: Thalassemia major, Thalassemia minor. β-Thalassemia syndromes result from a decrease in β-globin chains, which results in a relative excess of α-globin chains.B-thalassemia is a hereditary blood disorder with common single gene abnormality[1].β-thalassemia is a global disease that is most highly prevalent in Southeast Asia, Africa, and Mediterranean countries.The β-thalassemia is the most common inherited haemoglobin disorder in the Indian subcontinent, with an uneven distribution among the different endogenous populations.[9] In β-thalassemia, the abnormalities are seen in beta-chains; resulting in reduced or no synthesis of the particular chain that is needed to make up functional haemoglobin (Hb). Around 60-80 million people worldwide are affected by β thalassemia trait alone[2]. In India, various thalassemia traits vary from 3 to 17 per cent[3] and β-thalassemia is one of the major traits[4,5].Children with beta thalassemia become symptomatic from haemolytic anaemia, weakness and cardiac decompensation during the 2nd–6th month of life .Treatment for thalassemia major patients begins within 6months to 2 years of life, but rarely later. The classic presentation of children with severe disease includes thalassemic facies (maxilla hyperplasia, flat nasal bridge, frontal bossing), hepatosplenomegaly and cachexia). Infants with β-thalassemia major are identified on routine haematological investigations; with progressive decrease in Hb %(< 6gm/dl), microcytosis (MCV), hypochromia (MCH), elevated reticulocyte count to 5-8%, target cells and basophilic stippling.High performance liquid chromatography for haemoglobinis the test for confirmation of the diagnosis of β-thalassemia major.The treatment includesrepeated blood transfusions, management of iron overload with iron chelation[6]and splenectomy. Individuals with β-thalassemia major require to receive blood or blood products at regular intervals for optimum health management and to maintain their Hb% levelsat 9-10gm/dl. Transfusion transmitted infections (TTI) such as HIV, hepatitis B virus (HBV) and hepatitis C virus (HCV) are major risk factors leading to chronic infection[3,7]. HCV and HBV infections are the most common post transfusion transmissible infections among β-thalassemic individuals[4].

Blood or blood product transfusion is the most common cause of Hepatitis B and Hepatitis C infection in β-thalassaemic major individuals.HBV and HCV patients have high risk of developing chronic hepatitis, liver cirrhosis and hepatocellular carcinoma. Repeated blood transfusions are also associated with hazards like iron overload which can lead to endocrinal dysfunction in the form of growth

retardation and diabetes mellitus. The World Health Organization (WHO) estimates during 2019 states that, 296 million people worldwide are living with hepatitis Band 58 million people worldwide are living with hepatitis C ,with global prevalence of 3.5% and 3.0%.About 1.34 million people die from liver cancer and cirrhosis caused by HBV and HCV infections.In India, the prevalence of HBV and HCV in the general population is about 4% and 1%.Highest prevalence are recorded from Andaman and Arunachal Pradesh.Different studies from all over India report HCV seroprevalence in thalassemia patients between 11-30%[8]and HBV prevalence between 1.2% to 7.4%. On a routine basis, the HBV and HCV is diagnosed by rapid immunochromatography test and confirmed by ELISA test.

Aims and Objectives

The aim of this study is to estimate the prevalence of Hepatitis B and Hepatitis C infection in multiple bloodor blood product transfused in beta thalassemia major patients and create awareness about their prevention.Ultimately thalassemic patients die either due to transfusions complications or due to lack of it, with the result that they seldom survive beyond the age of 25 years in our region.

Material and Methods

Study area: The prevalence of hepatitis C virus (HCV), hepatitis B virus (HBV), in thalassemic children attending the OPD of MGM, MCH, Jamshedpur.
Study Design: cross sectional and observational study
Study Population: Study Population was Thalassemic patients attending OPD of paediatrics and Medicine, less than 25 years of agein MGMMCH Jamshedpur. A total of 110 beta thalassemia patients aged between 2-25years were categorised into four groups (2-7 years, group 1; 8-13 years, group 2; 14-19 years, group 3 and 20-25 years, group 4).

Inclusion criteria:
Known case of beta thalassemia patients who were transfused at least 25 units of blood, and patients under 25 years of age.

Exclusion Criteria:
1. Children receiving Transfusion of blood for other diseases.
2. Thalassemic Children acquiring Hep B and Hep C before start of transfusion of blood.
3. Individuals who had more than 25years old
4. Patients undergoing interferon treatment

Time period: Progressive study was conducted for six months from December2020 - May 2021.

Sample Size: Data was obtained from 110 thalassemic patients aged between 2 years and25 years, with atleast 25 units of blood transfusion receivedat regular intervalsand attending OPD in MGMMCH Jamshedpur from December 2020 to 31st May 2021.

Data Collection and Laboratory testing: Participants were recruited from various departments like Paediatrics and Medicine. And samples send in microbiology department, ICMR approved VRDL lab for testing. 5 ml Blood sample was collected. Serum was separatedby centrifugation at room temperatureand subjected to test for HBsAg, and antibody to Hepatitis C, by ELISA method.Screening was done by Immunochromatographic test (point of care test).

Results

A total of 110 patients of beta thalassemia major were included in our study, out of this 68(62%) were males and 42(38%) were females. Their ages ranges from 2-25 year. The age of thalassemia patients at time of diagnosis ranged from 6months to 3 years of age. The age at the time of this study ranged between 2years and 25 years. Blood transfusion started at the age of 2years in thalassemia patients, and continuously transfused at regular interval to maintained Hb% level around 9-10gm/dl. Out of 110 thalassemia patients 14 (12.7%) had taken more than 200 blood transfusion, 92(83.6%) thalassemia patients received less than 200 units blood transfusion and 4 (3.7%)patients died. In our study, out of the 110 thalassemia patients, 19(17%) patients were HCV reactive, 6(5.5%) were HBV reactive and 3(2.75%) were both HCV and HBV reactive. Out of 68 male thalassemia patients, 11 are HCV reactive, 4 are HBV reactive and 02 had coinfections with both HCV and HBV. Out of 42 female thalassemia patients, 08 are HCV reactive, 02 are HBV reactive and 01 had coinfections with both HCV and HBV.

Table 1: Sex and age wise distribution of beta thalassemia cases

SEX	GR-I, 2-7 Y	GR-2, 8-13Y	GR-3,14-19Y	GR-4,20-25Y
MALE	42	15	07	04
FEMALE	22	15	03	02
TOTAL	64	30	10	06

Table 2: Total transfusion till date

No. Of unit blood transfused	No. Of beta thalassemia patients
<200 unit BT	92
>200unit BT	14

Table 3: Total number of HCV, HBV and combined HBV and HCV reactive in group wise

NO. of reactive	GR-I, 2-7 Y	GR-2, 8-13Y	GR-3,14-19Y	GR-4,20-25Y
HCV	03 (0.05%)	08 (0.27%)	06 (0.6%)	02 (0.33%)
HBV	01 (0.02%)	02 (0.07%)	02 (0.2%)	01 (0.16%)
HCV and HBV	00	01 (0.03%)	01 (0.1%)	01 (0.16%)
Non reactive	60	19	01	02
TOTAL	64	30	10	06

Discussion

In this study, out of 110 thalassemia patients, 19(17.3%) patients are HCV reactive, 6(5.5%) patients are HBV reactive and 3(2.75%) are both HBV and HCV reactive. As the age of the patient increased, the number of transfusions increased, and consequently the positivity also increased. This study was very similar to the study of Mukherjee K et al which shows 24% HCV reactive, 3.4% HBV reactive.[9]In two studies from Western India, the prevalence of HCV in multiple transfused thalassemics was 16.7% and 17.5%, respectively.[9,10].The number of units of packed red blood cells transfusion was significantly higher in patients with reactive HCV and HbsAg cases compared to negative subjects, implying that the risk of infection rises with eachunit of blood transfusion. [11]

In our study,the prevalence of HCV infection is higher in comparison to HBV infection, because most of the patients had received two doses of recombinant DNA vaccine against Hepatitis B after being diagnosed with thalassemia.Six children who were found HBsAg positive, were either non-vaccinated or had received only a single dose of vaccination before starting transfusion. Similar results were found in studies in Jordon and Iran with measured HBsAg prevalence being 3.5% and 1.5% respectively indicating vaccination against Hepatitis B decreases the incidence of HBsAg positivity.[12]Estimates of the risk of blood-borne infections by stringent screening are essential for monitoring the safety of blood supply. Blood screening using the viral antigen and nucleic acid amplification tests (NAT) can reduce the window periods of HIV, hepatitis B virus and hepatitis C virus infections substantially.[13] Blood transfusion, a lifesaving modality, can be made safer by the introduction of the NAT for screening of blood units for HIV, hepatitis B and hepatitis C viruses and it can be made cost-effective by analysing multiple samples together.[14]

Conclusion

More sensitive screening tests and stringent donor selection processes are required for the better control of this transfusion - transmitted infections among Thalassemia patients. Rigid implementation of quality control measures for the ELISA kits used to detect HCV and HBV in donor blood needs to be done urgently. Alternately, more sensitive and specific measures (like NAT testing) should be employed for detection of HCV and HBV.It is also suggested to revise and devise suitable transfusion regime so that a balance between adequate transfusion and minimum of side effects of multiple transfusions is maintained.
We have to create awareness about hepatitis B vaccination. Genetic counselling is indicated to create awareness and prevent thalassemia major in subsequent offspring. In the absence of a definitive cure accessible and available to all patients, strict implementation of the above suggested measures will go a long way in improving the quality of life and increasing the life spanofbeta-thalassemia major patients.

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