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STUDY OF HEPATITIS B IN VACCINATED THALASSEMIC CHILDREN AT TERRITORY CARE HOSPITAL

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Abstract:

Objective: *To study of hepatitis B in vaccinated thalassemic children at territory care hospital.*

Material and methods: *This cross-sectional study was conducted at Department pediatric medicine, Bahawal Victoria Hospital, Bahawalpur from July 2019 to December 2019 over the period of 6 months. Total 240 patients were selected by non-probability sampling technique. Hepatitis B was assessed in selected patients.*

Results: *The mean age of cases was 7.25 ± 3.43 years with minimum and maximum age of 3 and 15 years. There were 130(54.17%) male and 110(45.83%) female cases. The mean number of blood transfusions was 4.60 ± 1.16 with minimum and maximum transfusion as 3 and 7. According to operational definition only 8(3.3%) children were diagnosed of HBV. When data was stratified for age, gender and number transfusion, significant association was found between HBV and higher no of transfusion.*

Conclusion: *Hence it can be concluded that the frequency of HBV is very low in in vaccinated thalassemic children receiving multiple blood transfusions. Hence vaccination for HBV must be ensured in thalassemic children receiving multiple blood transfusions. By adopting such strategies further risk of related complications can be minimized and prognosis can be improved.*

Keywords: *HBV vaccination, blood born disease, thalassemia, blood transfusions, complications*

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INTRODUCTION:

Thalassemia is one of the most common genetic diseases in the world. It is a major health problem, brings much morbidity, early mortality and great deal of misery for a family both financially and emotionally. Patients with thalassemia major should receive blood transfusion regularly to maintain optimal hemoglobin (Hb) level.[1] Such transfusion, however, increase exposure to hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV).[2] Worldwide, from 0.3% to 5.7% of thalassemia patients are hepatitis B surface antigen (HBsAg)–positive and from 4.4% to 85.4% are positive for anti-hepatitis C antibodies.[1] The prevalence of HBV chronic infection is higher in Asia and Southeast Asia countries.[3] Studies have shown prevalence of HbsAg positivity in Iran, Turkey, Thailand, Lebanon, India and Malaysia, Bangladesh, Egypt to be 1.5%, 0.8%, 2%, 0.3%, 3.8%, 2.4%, 6.5%, 29% respectively. This difference in prevalence highlights the importance of local control and socio-demographics highlighting the importance of preventive strategies in these high risk patients.[4-5]

The current risk of transfusion-transmitted viral infection is estimated to be less than 2.5 per 1 million donations in the United States, Canada, and several European countries.[1] The situation differs in developing countries that have not yet incorporated the key requirements for a modern blood transfusion system. Most of these countries are in Asia and Africa.[5] Vaccination against HBV infection is a key intervention in preventing the transmission of HBV and is a critical strategy in reducing the global morbidity and mortality.[6] Persons immunized against HBV enjoy long-term protection, and countries that have implemented universal hepatitis B immunization have experienced a significant reduction in HBV-related diseases.There are more than 2 billion people with hepatitis B infection worldwide with 350 million people as hepatitis B virus carriers.[3] On the other hand, thalassemic patients may have iron overloading due to chronic blood transfusion which could lead to impaired immune response toward vaccination. Therefore, determination of immune response in multi-transfused patients is very important.[1,5,7] Active immunization through the hepatitis B vaccination before exposure to virus is the most effective way to prevent infection. [1-7] Based on the serum levels of anti-HBs, subjects are categorized as good responder (anti-HBs >100IU/ml), low responder (anti-HBs 10-100 IU/ml) and non-responder (anti-HBs <10IU/ml). After vaccination, anti-body will appear in serum and remains for a long period of time. In 50% of cases, level of the anti-body is not detectable after vaccination and they need to be revaccinated. In a study from 217 thalassemic patients who were vaccinated against HBV, 18.4% were non-responders which isalarming.[6] This is important in resource limited settings because once a child is vaccinated, healthcare workers and parents may not be as vigilant in case of potential exposures e.g., needle stick as they would have been if the child were unvaccinated because of supposed protection by vaccination even though anti-HBs are rarely checked in such children. There are studies on frequency of hepatitis B in thalassemia children as quoted above, however, very few studies have reported rates of hepatitis B in vaccinated children. In a study from Pakistan, the seropositive rate of HbsAg in unvaccinated children was 12.2%;[6] while among 218 children vaccinated during the first year of life via the Pakistan Expanded Programme on Immunization, the seropositive rate was only 0.9%. However, a study from Iran on efficacy of vaccination in thalassemia children found strikingly different results with 4.04% of vaccinated children had hepatitis B while another 10.1% were anti-HBs negative (non-responders).[7] This data highlights the need for undertaking a prospective comprehensive study for determining the frequency of Hepatitis B among vaccinated children so as to raise awareness and potentially reduce transmission in these children who are vaccinated and didn't respond so that they can be revaccinated. This study can thus be conducted to focus on this subgroup of patients with thalassemia to evaluate the frequency of HBV infection in vaccinated children with thalassemia major disease in our hospital.

OPERATIONAL DEFINITIONS

THALASSEMIA

Patients with HbF>90% in absence of transfusion were labeled as having thalassemia.

Hepatitis B

Patient positive for hepatitis B virus antigen (HbsAg) infection by enzyme-linked immunosorbent assay (ELISA) was labeled as having hepatitis B.

Vaccinated Children

Children who have completed course of HBV vaccination as per their EPI record were labeled as being vaccinated (on history / vaccination card).

Multiple Blood Transfusions

Children who have received 2 or more than 2 transfusions of blood were labeled as having multiple transfusions. This was determined from medical record.

MATERIAL AND METHODS:

This cross-sectional study was conducted at Department pediatric medicine, Bahawal Victoria Hospital, Bahawalpur from July 2019 to December 2019 over the period of 6 months. Total 240 patients were selected by non-probability sampling technique.

INCLUSION CRITERIA

- All children of both genders with thalassemia as per operational definition aged 6 months to 15 years who had been transfused more than 2 units of blood up to the time they were screened.

EXCLUSION CRITERIA

- Children with evidence of HbsAg positivity as per medical record before start of transfusions
- Children born to mother positive for hepatitis B per medical record
- Children who underwent any surgical intervention per medical record
- Children with history of hemodialysis or peritoneal dialysis as per medical record

DATA COLLECTION PROCEDURE

A total of 240 children aged between 6 months and 15 years with thalassemia as per operational definition was selected after taking informed consent from parents. Bio data was entered in a predesigned structured Performa. Test for HBV was done using ELISA for the detection of HBsAg in human serum or plasma. The blood sample used in the study was obtained before packed red blood cells transfusion. All information and test results were kept confidential.

DATA ANALYSIS PROCEDURE

Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 20. Qualitative data like gender, hepatitis B in vaccinated thalassemia children was presented as frequencies and percentages. Quantitative data i.e., age and no of transfusions was presented as means and standard deviations. Data was stratified for age, gender, no of transfusions to deal with effect modifiers. Post stratification chi-square test was applied, taking p-value ≤ 0.05 as significant.

RESULTS:

Total 240 patients were selected for this study. Mean age of the patients was 7.25 ± 3.43 years with minimum age 3 years and maximum age15 years. Mean number of blood transfusions was 4.60 ± 1.16 with minimum and maximum transfusion as 3 and 7. Out of 240 patients, hepatitis was found in 8 (3%) patients. (Fig. 1) Selected patients were divided into two groups according to their age i.e. age group **< 6 years** and age group ≥ 6 years. Total 83 (34.58) patients belonged to age group <6 years and hepatitis B was found in 2 (2.41%) patients. In age group ≥ 6 years, out of 157 (65.42%) patients, hepatitis B was found in 6 (3.82%) patients. Statistically insignificant association between age group and hepatitis B was noted with p value 0.562. (Table 1)

Male patients were 130 (54.17) and female patients were 110 (45.83). Hepatitis B was detected in 5 (3.85%) male patients and in 3 (2.73%) female patients. But no association between gender and hepatitis was detected with p value 0.630. (Table 2)

Patients were divided into two groups according to number of transfusion i.e. 3-4 transfusions group and ≥ 5 transfusions group. Total 115 (47.92) patients belonged to 3-4 transfusion group while 125 (52.08) patients belonged to ≥ 5 group. Hepatitis B was detected in 1 (0.87) patients and 7 (5.6) respectively. Association of hepatitis B with number of transfusion was statistically significant with p value 0.041. (Table 3)

Fig. 1: Frequency of hepatitis B

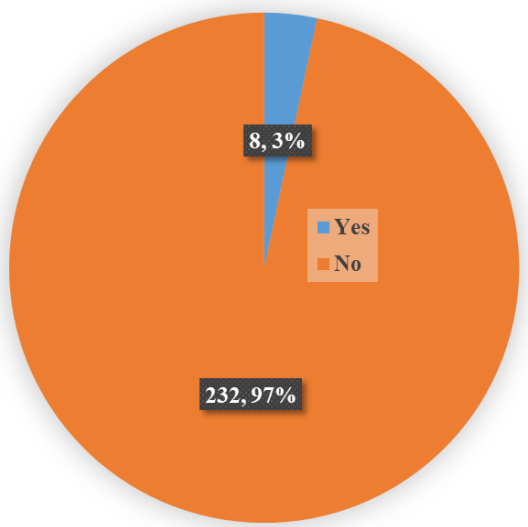

Table 1: Association of hepatitis B with age

Age Group	Hepatitis B		Total	P value
	Yes	No		
< 6 years	2 (2.41)	81 (97.59)	83 (34.58)	0.562
≥ 6 years	6 (3.82)	151 (96.18)	157 (65.42)	
Total	8 (3)	232 (97)	240	

Table 2: Association of hepatitis B with gender

Gender	Hepatitis B		Total	P value
	Yes	No		
Male	5 (3.85)	125 (96.15)	130 (54.17)	0.630
Female	3 (2.73)	107 (97.27)	110 (45.83)	
Total	8 (3)	232 (97)	240	

Table 3: Association of hepatitis B with number of transfusions

Number of Transfusions	Hepatitis B		Total	P value
	Yes	No		
3-4	1 (0.87)	114 (99.13)	115 (47.92)	0.041
≥ 5	7 (5.6)	118 (94.4)	125 (52.08)	
Total	8 (3)	232 (97)	240	

DISCUSSION:

The objective of present study was to evaluate the hepatitis B in thalassemia patients. Total 240 patients were selected for this study. Mean age of the patients was 7.25 ± 3.43 years with minimum age 3 years and maximum age15 years. Mean number of blood transfusions was 4.60 ± 1.16 with minimum and maximum transfusion as 3 and 7. Out of 240 patients, hepatitis was found in 8 (3%) patients.

Singh et al[8] in 2003, done a study to evaluate the true prevalence of HBV in individuals with beta-thalassemia and enrolled seventy patients with beta-thalassemia (median age 6 years; 49 male), who had received seven to 623 (median 61) units of blood each and three doses (10/20 micro g) of HBV vaccine.

In 2012, a prospective study was carried out to estimate the real frequency of hepatitis B virus (HBV) and hepatitis C virus (HCV) among Egyptian b-thalassemic patients. They completed the study on 111 males and 89 females, with a median age of 13 years.[9] This age distribution is greater than our study. They further reported that eighty-one (40.5%) patients were having Anti HCV Antibodies positive by ELISA and 39 (19.5) were anti-HCV positive By RIBA; 58 (29.0%) were HBsAg positive and 13 (6.5%) were anti-HBc positive.[9] In current study only 8(3.3%) children were diagnosed of HBV. The frequency of HBV was comparable to above study.

Another study reported in 99 beta-thalassemic children, 89 (89.9 %) were anti-HBs positive (responders) and 10 (10.1%) anti-HBs negative (non-responders). 3 (3.03%) were anti-HBc positive and 1(1.01%) was HBsAg positive.[10] One study reported that four of 70 (5.7%) individuals with beta-thalassemia were HBsAg positive and 14 (20%) were anti-HBc positive. The prevalence of serological markers increased with number of transfusions (P < 0.01). Of 70 patients, 53 (75.7%) had an anti-HBs titre of > 10 IU/l following vaccination and 17 (24.3%) were non-responders (< 10 IU/l); 22 (31.4%) of the 70 were DNA positive.[11] One more study reported that hepatitis B in patients with thalassemia i.e. 4.04%vaccinated thalassemia children receiving multiple blood transfusions. [13] In our study the frequency of HBV was lower than study discussed above.[13]

Older age, an increased number of transfusion units, and HBsAgseropositivity were significantly associated with a higher prevalence of HCV and HBV [11]. In current study significant association of HBV was found with higher number of blood transfusion.

CONCLUSION:

Hence it can be concluded that the frequency of HBV is very low in in vaccinated thalassemic children receiving multiple blood transfusions. Hence vaccination for HBV must be ensured in thalassemic children receiving multiple blood transfusions. By adopting such strategies further risk of related complications can be minimized and prognosis can be improved.

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