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# Hepatitis screen in children with malignancy at child's central teaching hospital

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***Abstract*---**Introduction: Transfusion-transmitted infections continue to be a threat to the safety of the blood supply, in particular the risk is high for parenterally transmitted viral hepatitis in pediatric malignancy. The aim was to estimate the prevalence of hepatitis in children with malignancy, identify some variables that could affect the prevalence of hepatitis in these patients, and to have an idea about the effect of vaccination in controlling hepatitis infection. Method: A Cross sectional study of (180) children between the age of [1-15] years with malignancy, in the period seven months, diagnosed and treated in CCTH were studied. Among those children with malignancy, testing for HBV and HCV were done through blood samples taken from the patients and sent to lab. of CCTH. Results: patients were referred from different parts of the country, from (180) patients with malignancy, 48(27%) were HBV positive &33(20%) with HCV positive. History of clinical jaundice was reported in 33 of cases (18%). The no. of blood transfusion had significant impact on prevalence of hepatitis virus infection. Conclusion: There is a high prevalence of HBV&HCV infection in patients with malignancy treated in Child's Central Teaching Hospital (CCTH).

***Keywords*---**hepatitis screen, children, malignancy, child's central teaching hospital.

## Introduction

Viral hepatitis is a major Health problem in both developing and developed countries. This disorder is caused by at least five pathogenic hepatotropic viruses

are designated hepatitis A, B, C, D, E and G, many other viruses can cause hepatitis as one component of amultisystem disease which includes herpes simplex virus, cytomegalo virus, Epstein-Barr virus, varicella-zoster virus, HIV, rubella, adenoviruses, enteroviruses, parvovirusB19 and arboviruses. Hepatitis G virus (HGV) and transfusion transmissible virus (TTV) often infect the liver as a co-infection with another hepatotropic virus, and may produce acute or chronic viremia but rarely produce hepatocellular injury on their own [(1)]. Transfusion-transmitted infections (TTI) continue to be a threat to the safety of the blood supply. Viral infections cause the major part of mortality and morbidity in blood recipients [(2)]. Patients treated for pediatric malignancy are at high risk for parenterally transmitted viral hepatitis [(3)]. Blood product transfusion is the major risk factor. Moreover, when compared with immunocompetent patients, the immunodepression caused by chemotherapy increases the chronicity rate of viral hepatitis [(4)]. During the last 2 decades, screening blood donors for the hepatitis B virus (HBV) has resulted in a remarkable reduction of post-transfusion B virus hepatitis. Thus, HCV has become the major cause of the parenterally transmitted hepatitis [(5)]. Over the two last decades, much attention has been given to the prevention of transfusion-transmitted viral infections such as HIV-1 and -2, human T cell lymphotropic virus (HTLV) I and II, hepatitis C virus (HCV), hepatitis B virus (HBV) and West Nile Virus (WNV). Given the potential transmission of viruses during the 'immunological window period' [i.e. the period of early infectivity when an immunologic test is non-reactive] [(6)]**.** However, it has some limitations in blood components with very low levels of viremia, which can even escape detection by NAT. Despite this limitation, the combination of both serological testing and NAT has considerably reduced the risk of viral transmission by blood transfusion [(7)]. In order to maintain the integrity, purity and adequacy of the blood supply new donor screening assays, donor deferral and pathogen inactivation of blood components need to be balanced against the undue loss of potential donors because of overly stringent exclusion criteria [(8)]. The aim of study is to find out the overall prevalence of HBV and HCV among patients with malignancy in CCTH and to find out the effect of frequent blood transfusion or blood product transfusion on the prevalence of hepatitis B and C.

**Method**

A cross sectional study was carried out in the oncology department of child's central teaching hospital in Baghdad city. A total of (180) children between the age of [1-15] years with cancer, over seven months between December 1st, 2009 to June 30th, 2010, diagnosed before 6 months and more and treated in CCTH were studied, (from atotal of 180 patients, 3 patients were not tested for HBs Ag. And 15 patients were not tested for anti HCV antibody). Information regarding (name of patient, date of birth, sex, date of diagnosis, hepatitis screen at time of diagnosis, number of hepatitis vaccines given, number and place of blood transfusion, and history of jaundice) were obtained. These data were taken from hospital records, questionnaire of the parents & from the patient's own medical notebook (provided to parents during first hospitalization) which contain all information regarding inpatient & outpatient visits with the detailed management. The results of hepatitis screen at time of diagnosis of cancer were taken from the hospital records. Among those children with malignancy, evaluation for HBV and HCV were done through blood samples took from them and sent to lab. of CCTH.

Hepatitis B Surface Antigen and Anti Hepatitis C Virus Antibody were investigated by commercially available ELISA diagnostic kit techniques. For Hepatitis B; Bioelisa HBsAg 5,6 (Biokit) for screening tests made in Spain. For Hepatitis C; Bioelisa HCV 4,0 (Biokit) for screening tests made in Spain. No confirmatory tests were available for both HBV and HCV.

**Results**

The age (years) was[1-4 (42 patients 23.3%), >4-9 (81,45%), >9-15(57,31.7%)] mean age was 7.6 years, females were more predominant than males [93(51.7%)], the patients were referred from different parts of the country; however the majority were from other governorates[114(63.3%)], No. of HB vaccines were[3 vaccines 78(43.3%), <3 vaccines 76(42.2%), not given 26(14.4%)].(Table 3)

Table 3: Demographic & clinical data of 180 patients

| | No | % |
|---|---|---|
| Age (years) 1—4 | 42 | 23.3 |
| >4—9 | 81 | 45.0 |
| >9—15 | 57 | 31.7 |
| Mean±SD (Range) | 7.68±3.73 | |
| Sex Male | 87 | 48.3 |
| Female | 93 | 51.7 |
| Residence Baghdad | 66 | 36.7 |
| Others | 114 | 63.3 |
| Number of Hep B vaccines | | |
| 3 vaccines | 78 | 43.3 |
| <3 vaccines | 76 | 42.2 |
| Not given | 26 | 14.4 |

Of total 180 patients, only 177 were tested for HBsAg. while three patients were not tested. The impact of some variables on prevalence of HBV infection, these variables include age, sex, and residence. The most predominant age was between > 4-9 years[21(26.9%)]. The residence has significant effect on prevalence of HBV [ p value (o.ooo1)].(Table2)

Table 2: Impact of Age, Sex &Residence of patients on the prevalence of HBV infection

| | HBsAg positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Age (years) 1—4 | 12 | 28.6 | 30 | 71.4 | 0.968 |
| >4—9 | 21 | 26.9 | 57 | 73.1 | |
| >9--15 | 15 | 26.3 | 42 | 73.7 | |
| Mean±SD (Range) | 7.92 | | 7.65 | | |
| Sex Male | 27 | 32.1 | 57 | 67.9 | 0.153 |
| Female | 21 | 22.6 | 72 | 77.4 | |

| | | | | | |
|---|---|---|---|---|---|
| Residence Baghdad | 6 | 9.1 | 60 | 90.9 | 0.0001* |
| Others | 42 | 37.8 | 69 | 62.2 | |

*Significant using Pearson Chi-squared test at 0.05 level of significance

Of total 180 patients, only 165 were tested for HCV. while 15 patients were not tested. The impact of some variables on prevalence of HCV infection, The variables had no impact on prevalence of HCV infection[ age(p value 0.094), sex(p value 0.185), residence( p value 0.326)].(Table 3)

Table 3: Impact of Age, Sex &Residence of patients on the prevalence of HCV infection

| | Anti HCV Ab positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Age (years) 1—4 | 5 | 13.9 | 31 | 86.1 | 0.094 |
| >4--9 | 12 | 16.0 | 63 | 84.0 | |
| >9--15 | 16 | 29.6 | 38 | 70.4 | |
| Mean±SD | 9.97±3.07 | | 7.24±3.71 | | |
| Sex Male | 19 | 24.4 | 59 | 75.6 | 0.185 |
| Female | 14 | 16.1 | 73 | 83.9 | |
| Residence Baghdad | 9 | 15.8 | 48 | 84.2 | 0.326 |
| Others | 24 | 22.2 | 84 | 77.8 | |

Of 33 patients with jaundice, 21 patients were positive for only HBV, 9 patients were positive for only HCV and 3 patients were positive for both HBV & HCV. So the prevalence of HBV &HCV is more among patients with jaundice than those without jaundice (Table 4, 5).

Table 4: Impact of Jaundice &Vaccination on the prevalence of HBV infection

| | HBsAg positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Jaundice | | | | | |
| Positive | 24 | 72.7 | 9 | 27.3 | 0.0001* |
| Negative | 24 | 16.7 | 120 | 83.3 | |
| Number of HB vaccines | | | | | |
| 3 vaccines | 13 | 16.7 | 65 | 83.3 | 0.019* |
| <3 vaccines | 25 | 34.2 | 48 | 65.8 | |
| Not given | 10 | 38.5 | 16 | 61.5 | |

Table 5: Impact of Jaundice on the prevalence of HCV infection

| | Anti HCV Ab positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Jaundice | | | | | |
| Positive | 12 | 36.4 | 21 | 63.6 | 0.009* |

| | | | | | |
|---|---|---|---|---|---|
| Negative | 21 | 15.9 | 111 | 84.1 | |

Of total 180 patients, only 162 patients received blood (18 patients were not received blood).The prevalence of HBV were high among patients who received blood more than three times therefore the number of blood transfusion had significant effect, while the place had no significant effect on prevalence of HBV(Table 6, 7).

Table 6: Number &place of blood transfusions

| Number of blood transfusions | No | % |
|---|---|---|
| No transfusion | 18 | 10.0 |
| 1--3 | 90 | 50.0 |
| >3 | 72 | 40.0 |
| Place of blood transfusion | | |
| CCTH | 123 | 75.9 |
| Others | 39 | 24.1 |

Table 7: Impact of Number &Place of blood transfusions on the prevalence of HBV infection

| | HBsAg positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Number of blood transfusions | | | | | |
| No | 3 | 16.7 | 15 | 83.3 | 0.034* |
| 1—3 | 18 | 20.7 | 69 | 79.3 | |
| >3 | 27 | 37.5 | 45 | 62.5 | |
| Place of blood transfusion | | | | | |
| CCTH | 32 | 26.0 | 91 | 74.0 | 0.237 |
| Others | 13 | 36.1 | 23 | 63.9 | |
| Anti HCV Ab | | | | | |
| Positive | 9 | 30.0 | 21 | 70.0 | 0.961 |
| Negative | 39 | 29.5 | 93 | 70.5 | |

The results show the number & place of blood transfusion had no correlation with the prevalence of HCV infection [ No. of blood transfusions (no p value), place of blood transfusion ( p value 0.412), HBsAg ( p value 0.961)].(Table9).

Table 8: Impact of Number &Place of blood transfusions on the prevalence of HCV infection

| | Anti HCV Ab positive | | Negative | | |
|---|---|---|---|---|---|
| | No | % | No | % | P value |
| Number of blood transfusions | | | | | |
| No | - | - | 12 | 100.0 | - |
| 1--3 | 18 | 22.2 | 63 | 77.8 | |

| | | | | | |
|---|---|---|---|---|---|
| >3 | 15 | 20.8 | 57 | 79.2 | |
| Place of blood transfusion | | | | | |
| CCTH | 23 | 20.0 | 92 | 80.0 | 0.412 |
| Others | 10 | 26.3 | 28 | 73.7 | |
| HBsAg | | | | | |
| Positive | 9 | 18.8 | 39 | 81.3 | 0.961 |
| Negative | 21 | 18.4 | 93 | 81.6 | |

**Discussion**

The study has taken a sample of 180 patients with malignancy attending the oncological department of child's central teaching hospital so the prevalence of HBS Ag. among those patients was (27.1%), and the prevalence of anti-HCV was (20%). These results are comparably similar to the results to the study done in CWTH [9] that found the prevalence of HBS Ag. was (27.3%) but higher than the prevalence of HCV that was (7.8%). Another study carried by Ali S.M. [10] included 607 patients with leukemia& lymphoma at CCTH, hepatitis B surface antigen was positive in 20/607 (3.29%) and Anti-HCV was 6/607 (0.98%). Mollah AH [11] from Bangladesh showed that The HBV and HCV-markers were found significantly more often among multi-transfused thalassaemic children than among the controls in terms of HBsAg (13.8% vs 6.5%, $p < 0.04$) and anti-HCV (12.5% vs 0.9%, $p < 0.0001$) Another study done in Brazil showed that the overall prevalence of HCV, HIV, HBV and co-infection among MTP were 16.7%, 1.7%, 0.8% and 1.7% respectively [12]. Children with cancer require multiple transfusions during intensive therapy are at an increased risk of blood transmissible infections, such as HBV and HCV infections. The need for frequent blood counts, intravenous therapy and surgery in addition to the immunosuppressed status of these patients further increase the risk [13]. The variables are age, sex and residence which may have an impact on the prevalence on HBV &HC V infection. The effect of age may have related to two directions; first: whether the prevalence of hepatitis in the younger age group is lower due to high efficacy of hepatitis vaccine received through the (NIP), second: whether chronic hepatitis is affected by age group as mentioned previously, the older the age of acquisition, the lower the risk of chronic disease [14]. This study didn't show any significant association between prevalence of hepatitis and age, also similar results regarding the sex, this results approximately similar to the results of study carried in CWTH [9], But different from the results of the other study carried by Ali S.M [10]. This study shows that patients with history of clinical jaundice were (18%), among those with jaundice were HBsAg positive in (72.7%) and HCV Ab positive in (36.4%), these results higher than the results carried in CWTH [9]. It showed that patients received three doses of HBV vaccine had better protection against HBV in comparison with those who received less than three doses or never taken any dose of HBV vaccine, on the other hand some children who received three doses of vaccine but do not get protection against infection with HBV, which might raise the question of the efficacy of the vaccines given, the possibility of attenuation of immune system during period of receiving chemotherapy and the reliability of the history taken from the parents . This results were different from the results of study occurred in CWTH [9]. This study showed the risk of blood transfusion for transmission of HBV increase with the

increased in number of blood transfusion, while risk of transfusion transmitted viral infection (HCV, HBV) in France for the 2001-2003 periods was estimated at 1 in 10 million for HCV and at 1 in 640 000 for HBV [15].

**Conclusion**

There is a high prevalence of HBV&HCV infection in patients with malignancy treated in Child's Central Teaching Hospital (CCTH). But there is lower incidence of HCV infections than HBV. Blood transfusions (more than 3 times) is significantly increasing the incidence of HBV infection and HBV vaccine is significantly reducing the incidence of HBV infection.

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