Hepatitis B and C Viral Infection in B-Thalassemic Children

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ABSTRACT

The main objective of this study is to show how both hepatitis B and C Viral Infection in B-Thalassemic patients occurs and a study of their liver functions. To define the occurrence of either hepatitis A or B and C viral infection across the B-Thalassemia key clients/patients in Thalassemia Center of AL-Diwanyia Maternity and Children hospital from 1st Jan. – 1st Nov.2017. To carry out the study, it enlisted 54 patients; 31 patients were male (57.4%) in which the male to the female ratio was 01.4:01. Results for this study revealed that 2 patients had Hepatitis B (3.7%), and 6 patients had Hepatitis C (11.1%). The Liver enzymes were significantly more in those patients having either Hepatitis B or C viral infection. According to this study, it was revealed that the occurrence of HBsAg seropositive in B-thalassemic patients was 307%, and Anti-HCV seropositive were 11.1%, and the rate is lower than reported in many countries. The occurrence of Anti-HCV seropositive is higher than that for HBsAg seropositive. Also, the probability of having liver injury was high for thalassemic patients whom were HBsAg positive & Anti-HCV positive than that of seronegative for HBsAg & Anti- HCV.

INTRODUCTION

The origin of the term Thalassemia is in Greek, and it means ‘anemia of the sea.’ According to Dacia and Lewis (2001), Thalassemia is a major healthcare problem across the globe. Its syndrome can be termed to be heterogeneous, shown by a problem experienced in the production of a greater amount of globin chain, which comes from Hb tetramer (Rasekhi et al., 2002). One of the major genetic challenges exhibited is the full or partial elimination of the globin chain in a gene and also the nucleotide replacement. The results occasioned by several changes in the death or complete lack of mRNA in either single or multicellular globin chain. This can also be observed in the development of functioning defective mRNA resulting in the loss or prevention of HB.

According to E-Behrman (2004), during the polypeptide chain formation, the homozygous thalassemia B expresses itself as a high continuous hemolytic anemia across the second six-month phase of blood transfusions. This process is crucial for such patients as it inhibits the spread of anemia and heart collapse (E-Behrman, 2004). The most advanced countries are still experiencing cases of extreme thalassemia, cachexia, pathological fractures, and hepatosplenomegaly.

There are cases in which the spleen is enlarged, resulting in mechanical discomfort and also secondary hypersplenism. Such are the features that exhibit someone from being infected by erythropoiesis. Jaundice, Pallor, and hemosiderosis in the instance that they get combined, they end up forming a greenish-brown complexion. People suffering from thalassemia experience complications in
several parts i.e., cirrhosis, liver, fibrosis (Phadke, 1995). Other areas include beta-cell diabetes, across the pituitary, ovaries, testicles, retard in growth, and hypogonadotropic hypogonadism. For the case of parathyroid glands, it impacts hypocalcemia, osteoporosis. For the heart, myocarditis, arrhythmias, and cardiac insufficiency are challenging to treat (Dacia and Lewis, 2001).

Among the family of Hepadnaviridae, HBV is one of them, and it has a diameter of 42 nm and a hepatoatropic class of non-pathogenic DNA virus. The characteristics of HBV is that it is round, slightly made up of a double-strand DNA gene of roughly 3,200 nucleotides in length. Among the genes which have been identified are S genes, P and X, both of which are a polymer, and lastly, the C (core). Across its surface, there are a virus which encompasses the two particles making the hepatitis B. Its characters are that of being 22 nm wide tube-like particles and a variable length of 200 nm. Consequently, all the virion nucleus possess this virus-antigen (HBcAg), and a nucleocapsid which read the information from the viral DNA together with the unstructured antigen commonly referred to as hepatitis B and the above antigen. Other things in which this antigen encodes include the soluble antigen, both the soluble and insoluble HBcAg, which are a result of proteolytic cleavage. HBeAg main function is to be the active marker for all the viral replication. In most cases, HBV replication has been known to happen majorly in the liver, but it can also occur in other organs such as the spleen, kidneys, pancreas, and lymphocytes (Kapoor et al., 2000).

Across the world, some of the locations which have experienced the high cases of HBV include sub-Saharan Africa, some locations of the Middle East, China mainland, Pacific Islands, and Amazon basin. The U.S. has seen its Inuit population, which is present in Alaska, exhibiting high cases of HBV. The Federal health records give an estimate of six million individuals across the U.S. has been infected, in which 300,000 HBV cases were recorded the past year alone. Another observation is that the highest incidence is reported within the age bracket of 20 and 39 years. Contrary to this, children have been found to exhibit no signs of the disease. It is such observation which has led experts to believe that this chronic infection is related to age. According to researchers, less than 10 percent of the infections can be attributed to children, of which it represents a percentage in the region of 20-30 across the terminal cases reported (Olivieri et al., 1992). A lot of antigen and antibodies have been employed to diagnose acute HBV infection. Medical experts also advise individuals to have a routine check-up for infection, which needs at least two serological markers.

Studies have shown that HBsAg is the sole serological marker infection which is present in all the infected individual, with its growth possessing a coincidence with the start of the symptoms. Also, these serological marker has been discovered to be present across the acute phase, and it shows a severe infectious condition. As a result of HBSAg levels falling before the end of symptoms, there is the need for anti-HBCAg IgM to rise shortly after infection and to continue for a lot of months and even years. All the perinatal patients have shown a lack of anti-HBCAg antibodies, and which is the most crucial serological marker for acute HBV infection due to its presence in HBSAg and continuation to exhibit itself later even when the disease disappears. Those people who have been immunized against hepatitis B, it is only the anti-HBSAg that is present, and those individuals with resolved infection exhibiting the detection of anti-HBSAg and anti-HBCAg (Donohue et al., 1993).

PATIENTS AND METHODS

Across sectional study showing the occurrence of either hepatitis B or C pathological contamination across the B-Thalassemia major patients in Thalassemia Center of AL-Diwanyiah Maternity and Children Hospital, Iraq, from 1st. Jan. – 1st.Nov.2017. The study was conducted on 54 patients; 31 patients were male (57.4%), male: female ratio was 1.4:1. The current study depends on a survey module completed by an observer, and it encompasses conclusive literature and a clinical trial obtained for all the clients/patients involved in the study. Hb. Electrophoresis was necessary for our study for inclusion B-thalassemia major.

Blood samples were aspirated from patients for the following tests,

1. Liver function test (LFT),
   (a). TSB (direct & indirect)
   (b). Liver enzymes (ALT, AST&ALP)

Figure 1: Sex distribution of cases
Table 1: The occurrence of HBsAB seropositive among B-thalassemia major Patients

| No | seropositive | %   | Seronegative | %   | total |
|----|--------------|-----|--------------|-----|-------|
| 2  |              | 3.7 | 52           | 96.3| 54    |

Table 2: showing the occurrence of ‘Anti-HCV’ seropositive within the b-thalassemia patients.

| No | seropositive | %   | Seronegative | %   | total |
|----|--------------|-----|--------------|-----|-------|
| 6  |              | 11.1| 48           | 88.9| 54    |

Figure 2: HBsAg seropositive & seronegative thalassemic patients by age group.

They were measured by colorimetric methods (Tang, 1991; Sherlock, 1995)
2. HBsAg (by 3rd generation ELSA) (Lefrere et al., 1997).
3. HCV antibodies (by 3rd generation ELISA (Lefrere et al., 1997).

Statistical analysis

To carry out a conclusive statistical analysis, Microsoft Office Excel and SPSS were employed in order to diagnose the data. Also, the study used Fisher’s exact test and chi-square to determine the relationship among two nominal variables. A, P value less than or equal to 0.05 was perceived to be substantial.

RESULTS AND DISCUSSION

The cross-sectional study encompassed a cumulative number of patients suffering from thalassemic, which was 54 patients / male patients 31 (57.4) and female 23 (44.2%), the male-female ratio is 1.4:1 as shown in Figure 1. From this study, we found the occurrence of HBsAg positive among B-thalassemic patients was 2 patients (3.7%), and those who were HBsAg seronegative Thalassemic patients were 52 patients (96.3%) as shown in Table 1. The sum and the percentage of HBsAg positive as per the age group are shown in Figure 2. The occurrence of Anti-HCV positive among B-thalassemic patients were 6 patients (11.1%). The number of Anti-HCV seropositive patients was 48 patients (88.9%), as shown in Table 2. The number and the percentage Anti-HCV positive according to the age group is shown in Figure 3. The presence of positive HBsAg and anti-HCV depending on the sex of patients is shown in Figure 4. A positive effect of HBsAg and anti-HCV positively on liver function significantly (p-value <0.05), as shown in Table 3 and Table 4.

Figure 3: Anti-HCV seropositive & seronegative thalassemic patients by age groups

Figure 4: The occurrence of HBsAg +ve & Anti-HCV +ve according to the sex of the Patients

Earlier before the routine test for anti-HCV antibodies in the blood, the risk associated with HCV
Table 3: L.F.T in HBsAg seropositive & ‘sero-negative thalassemic-patients’

| L.F.T | Seropositive value for its mean ± SE | Seronegative pts. (The Mean value) ± SE | The P value |
|-------|--------------------------------------|----------------------------------------|-------------|
| T.S.B. | 6.4 ± 0.8                            | 1.4 ± 0.13                             | < 0.05      |
| ALT   | 92.5 ± 20.5                          | 12.5 ± 1.2                             | < 0.03      |
| AST   | 90 ± 13                              | 13.3 ± 0.86                            | < 0.04      |
| ALP   | 95.5 ± 3.5                           | 50.5 ± 3.01                            | < 0.05      |

L.F.T. results were significantly higher among seropositive in comparison with seronegative patients.

Table 4: L.F.T. in sero-negative and sero-positive patients suffering from thalassemic

| L.F.T | Seropositive (the mean-value) ± SE | Seronegative pts. (The mean-value) ± SE | The P value |
|-------|----------------------------------|----------------------------------------|-------------|
| T.S.B. | 6.5 ± 0.34                       | 1.5 ± 0.13                             | < 0.05      |
| ALT   | 71.1 ± 17.4                      | 13.4 ± 1.2                             | < 0.04      |
| AST   | 66.6 ± 8.2                       | 13.6 ± 0.86                            | < 0.05      |
| ALP   | 100 ± 6.1                        | 51.5 ± 3.01                            | < 0.03      |

L.F.T. result was significantly higher among seropositive in comparison with seronegative patients

exposure was linked to its absence. Transfused blood and HCV occurrence are combined in the blood donor population (Montalembert et al., 1995). As a result, patients with hemoglobinopathies such as thalassemia, and especially those who are most often transfused with packaged red blood cells, were often infected with HCV, and the incidence varied geographically from 23% to 72% (Vrielink et al., 1994). The result of our study shows that 3.4% of thalassemic patients were seropositive for HBSAg & 11.1% of them were Anti-HCV seropositive. An individual who has decreased the level of HBC can tend to use the third generation ELISA method to conduct blood screening, a process which has been in use for decades now. Additionally, medical institutions have put up precautions to curb spreading the HCV infection and the use of a vaccine for hepatitis B for vaccination programs. The past few years have seen the vaccine being introduced for patients suffering from thalassemia (Ackerman et al., 2000). The current study revealed the approximately same occurrence of Anti HCV seropositive in comparison to a similar study was done in Basra in 1999 (9.5%).

Anti-HCV seropositive reported in some Arabian countries like Egypt (44%), Bahrain (40%) & Saudia Arabia (70%) in addition to other countries like Iran (27%), India (34%) & Pakistan (29%) were higher than our study. In the United States and the introduction of blood product screening, blood transfusion alone is responsible for at least 5 percent of all the new cases of hepatitis (Vulo and Geogranda, 1993). The difference between countries can be explained by different screening methods which encompass both the first and the second generation of ELISA techniques with varying frequencies of blood units used in treatment. For this study, the third generation was used. Generating an ELISA test with very high sensitivity and specifications (Agarwal et al., 1993). The study had revealed that aminotransferase level and total serum bilirubin remained considerably higher in seropositive patients/clients in comparison to Seronegative ones, this increase can be explained by direct damage to hepatocytes as a result of virus invasion or the development of an immune complex, therefore in these patients we need to measure transaminase levels every month for 6 months, if high levels persist, taking into account chronic hepatitis and liver biopsy (Donohue et al., 1993).

CONCLUSIONS

This study has revealed that the occurrence of HBsAg seropositive in B-thalassemic patients was 307%, and Anti-HCV seropositive were 11.1%, and the rate is lower than reported in many countries. The occurrence of Anti-HCV seropositive is higher than that for HBsAg seropositive. Also, there is also a high probability of liver damage, especially for those patients suffering with thalassemia classified with HBsAg and anti-HCV positive titer in comparison to HBsAg and anti-HCV seronegative titers.

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