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Prevalence of Hepatitis B and Hepatitis C Viruses in β-thalassemia Major Patient in AD-Diwanya province, Iraq

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Abstract

Background: transmition of infectious agent is still the most common cause of death and disability related to blood transfusion.

Objective: to estimate the prevalence of HBV and HCV in beta thalassemic major patients in Ad-Diwayah governorate.

Method: The current study is a retrospective cross sectional study involving sample of 80 thalassemic major patients who regularly visit thalassemia center in Ad-diwuryah for treatment, data that required in the study had been collected from patients, their guardians and from the records.

Results: The prevalence rate of HBV was 2.5% (l male and 1 Female) which was significantly associated with family history of hepatitis ; while the prevalence rate of HCV was 3.8% (1male and 2 female) which was significantly associated with age and family history of hepatitis.

Key words: *prevalence; hepatitis; thalassemia; major.*

Introduction

Thalassemia syndromes are characterized by varying degrees of ineffective hematopoiesis and increased hemolysis [1]. Clinical syndromes are divided into α- and β – thalassemias, each with varying numbers of their respective globin genes mutated. There is a widen array of genetic defects and a corresponding diversity of clinical syndromes. Most –thalassemias are duo to point mutation usually in both of the two β-globin genes (chromosome11), which can affect every step in the pathway of β- globin expression from initiation of transcription to messenger RNA synthesis to translation and post translation modification . A mutation in a single β- globin gene inherited along with triplicated alpha genes also may cause a β-thalassemia syndrome. Autosomal dominant forms of β–thalassemia also occur rarely [1] . β-Thalassemia major is caused by mutations that impair beta chain synthesis. Because of unbalanced synthesis of alpha and beta chains, alpha chains precipitate within the cells, resulting in RBC destruction either in the bone marrow or in the spleen . β -Thalassemia major is seen most commonly in individuals of Mediterranean or Asian descent. The clinical severity of the illness varies on the basis of the molecular defect. Signs and symptoms of β-thalassemia major result from the combination of chronic hemolytic disease, decreased or absent production of normal hemoglobin A, and ineffective erythropoiesis. The anemia is severe and leads to growth failure and high output heart failure. Ineffective erythropoiesis causes increased expenditure of energy and expansion of the bone marrow cavities of all bones, leading to osteopenia, pathological fractures, extra medullary erythropoiesis with resultant hepatosplenomegaly, and an increase in the rate of iron absorption. Treatment of β-thalassemia major is based on a hyper transfusion program that corrects the anemia and suppresses the patient's own ineffective erythropoiesis, limiting the stimulus for increased iron absorption. This suppression permits the bones to heal, decreases metabolic expenditures, increases growth, and limits dietary iron absorption. Splenectomy may reduce the transfusion volume, but it adds to the risk of serious infection. Chelation therapy with deferoxamine or deferasirox should start when laboratory evidence of iron overload (hemochromatosis) is present an before there are clinical signs of iron overload (non immune diabetes mellitus, cirrhosis, heart failure, bronzing of the skin, and multiple endocrine

abnormalities) [2] . When it is certain that they require regular transfusion, they should be given washed red cell transfusions at monthly intervals; it is vital that the blood is screened for human immunodeficiency virus(HIV)/ acquired immune deficiency syndrome, hepatitis B and C viruses [3] . Most death and disability related to blood transfusion worldwide is still caused by the transmission of infectious agents [4]. Despite the availability of a highly effective vaccine against hepatitis B, approximately 2 billion people worldwide are infected, 350 million with chronic active infection accounting for(600,000) attributable deaths annually worldwide. Hepatitis B is spread via blood and body fluid contact through heterosexual and homosexual relations, by sharing of needles by infected drug abusers, and by accidental needle sticks in the medical setting. In areas of high disease prevalence (e.g., Southeast Asia, China), transmission is primarily from mother to child during childbirth or in early childhood. The vaccination for hepatitis B uses recombinant DNA , requires three doses on a set schedule, and confers immunity in the majority of recipients. Patients with chronic infection can develop cirrhosis and end-stage liver disease. Hepatitis C affects more than 300 million people worldwide. At least six genotypes and 100subtypes have been identified .The diagnosis is established with serum testing for HCVRNA antibodies; although an antibody is induced, it is not protective against disease contraction and progression. Transmission occurs via blood or body fluid contamination through IV and intranasal drug use, blood transfusions, and in health care workers (eg., needle stick or skin disruption with contaminated instrument) [5].

Patients and Method

The study has been designed as a retrospective cross sectional study including a cohort of Iraqi patients having beta thalassemia major on regular transfusion therapy. No limitation for gender or age was proposed. An 80 patients were randomly selected in the study from the population of thalassemic patient regularly visit the thalassemia center in AD-diwaniyah for transfusion therapy (at least once monthly). Any patient had been diagnosed with HBV or HCV infection before starting the first transfusion had been excluded from the study,also family history of HBV or HCV prior to infection of thalassemic persons was one of the exclusion criteria. The study had been done at AD-diwayah thalassemia center in AD-Diwanyah governorate in Iraq. The study had been started from first of April 2019 and ended on the third of June 2019.The study had been approved by the committee of ethical approval at Collage of Medicine university of Al-Qadisiyah .Verbal consent had been taken from the patients who included in the study if their age was more than 18 years or from their guardians if they were younger than 18years old. The questionnaire had been designed to involve sociodemographic informations of patients included in the study like gender, age , residency'; if it was rural or urban area and occupation. Socioeconomic state also was part of the questionnaire, the patients classified as high, moderate and low socioeconomic state; taking in consideration their level of education, income, residency, number of family member comparing with number of rooms and the house size, also if the house was renting or their own.

Results

Distribution of patients with beta thalassemia major according to age

The frequency distribution of patients with beta thalassemia major according to age is shown in table 4.1. Patients less than 10 years old accounted for 29 (36.2 %), patients between 10 to 19 years old accounted for 38 (47.5 %), patients between 20 to 29 years old accounted for 8 (10.0 %) and patients between 30 to 39 years accounted for 5 (6.2 %). The mean age of all participants was 13.38 ±8.26 years with a range of 2 to 39 years, table 1.Majority of patients were between 10 to 19 years and < 10 years of age, as shown in figure 1.

Table 1: Distribution of patients with beta thalassemia major according to age

Age (years)	Value
< 10 years, n (%)	29 (36.2)
10-19 years, n (%)	38 (47.5)
20-29 years, n (%)	8 (10.0)
30-39 years, n (%)	5 (6.2)
Mean ±SD	13.38 ±8.26
Range	2 – 39

n: number of cases; SD: standard deviation

Distribution of patients with beta thalassemia major according to gender

The frequency distribution of patients with beta thalassemia major according to gender is shown in figure 2. Male patients accounted for 41 out of 80 (51.2 %), whereas, female patients accounted for 39 out of 40 (48.8 %). The male to female ratio was 1.05:1.

Distribution of patients with beta thalassemia major according to residency

Distribution of patients with beta thalassemia major according to residency is shown in table 2. Patients from urban areas accounted for 27 out of 80 (33.8 %) and patients from rural areas accounted for 53 out of 80 (66.2 %), table 2.

Table 2: Distribution of patients with beta thalassemia major according to residency

Residency	*N	%
Urban	27	33.8
Rural	53	66.2

*n: number of cases

The prevalence rate of hepatitis B and C viral infection in patients with beta thalassemia major

The prevalence rate of hepatitis B and C viral infection in patients with beta thalassemia major is shown in table 3. Two patients out of 80 were infected with HBV accounting for 2.5 %, while 3 patients out of 80 were infected with HCV accounting for 3.8 %, table 3.

Table 3: Hepatitis B virus and hepatitis C virus infection, positive family history of HBV and HCV and history of hepatitis vaccination

Characteristic	N*	%
HBV	2	2.5
HCV	3	3.8
Family history of HBV	2	2.5
Family history of HCV	2	2.5
Vaccine	80	100.0

*n: number of case

Correlation between HBV or HCV infection and age of patients with beta thalassemia major

Mean age of patients with HBV were older than patients who were free of HBV infection, 20.00 ±2.83 years versus 13.21 ±8.29 years, respectively; however, the difference did not reach statistical significance (P = 0.253). Mean age of patients with HCV were older than patients who were free of HCV infection, 24.33 ±12.74 years versus 12.95±7.86 years, respectively; and the difference was statistically significant (P = 0.018), as shown in table 4.

Table 4: Correlation between HBV or HCV infection and age of patients with beta thalassemia major

Hepatitis virus		n	Mean age (years)	SD	P
HBV	Positive	2	20.00	2.83	0.253 † NS
	Negative	78	13.21	8.29	
HCV	Positive	3	24.33	12.74	0.018 † S
	Negative	77	12.95	7.86	

n: number of cases; SD: standard deviation; †: Mann Whitney U test; NS: not significant at

Discussion

The current study had been designated in order to highlight the prevalence of HBV and HCV infection beta thalassemic patients in Ad-Diwanyah province since those patient need multi transfusion therapy for the rest of their lives, the fact that make them at higher risk to have blood transfusion transmitted infections, including HBV and HCV, and these infections can be transmitted to healthy persons by many routes other than blood transfusion and causing dangerous morbidity that reach hepatocellular carcinoma or even death. Also there is no other published study concerning about this topic in the mentioned area. Patients with beta thalassemia major had been targeted in the current study because those patients needs blood transfusion in a very early life time mostly in the first year of life so, if those patients had been infected with HBV or HCV, that would be most likely duo to transfusion of contaminated blood.

Regarding age distribution in thalassemic patients who involved in the study, it was ranging from 2 to 39 years old with 83.7% of them less than 20 years old which could be due to high fatality rate of thalassemic patients comparing with general population .This result had been agreed by many other studies in the vicinity like Kamal Dumaidi and co-worker study about prevalence of hepatitis C and B viruses among patients with B thalassemia in Palestine which reveal that (75%) of patients involved in the study were aging 24 years and less [6] . The mean of age in the current study was 13.38± 8.26 year , this result was near but less than the mean age in the studies that done in the vicinity , as in the study that had been done in Iran by silos Mohammadi and Mazaher Khodabandohloo about the prevalence of HCV antibodies among Beta thalassemia major patients which revealed that the mean age was 18± 8.05 years [7] . Male to female ratio was 1.05:1 since the inheritanc of thalassemia is autosomal which was agreed by Al-Naamani study in Oman [8]. 66.2 % of patients who included in the study were living in rural areas. Regarding occupations of patients who enrolled in the current study; most of patients were either so small to attend school , students or having no job apart from single patient who was a nurse. Most of patients involved in the current study was classified as low or moderate socioeconomic state (87.5%) and the other 12.5% was classified as high socioeconomic state. 85% of patients' parents were relative since most of them live in rural areas in which there is high rate of marriage between relatives. The rate of blood transfusion was ranging from 1 to 4 times per month patients with small age and patients who had splenectomy usually need transfusion 1 - 2 times per month while patients who didn't have splenectomy and reaching adulthood or teenage , they usually needs transfusion 3-4 times per month. The prevalence rate of hepatitis B virus infection in patients participating in this study was 2.5% (two patients out of 80) which was less than the result of similar study done by Widad Yazaji in Syria which is a neighboring country, the study involved 159 patients, the study reveal that 13.2% of patients were seropositive for hepatitis B infection (21patients out of 159) [9]. The prevalence rate of HCV infection in the current study was 3.8% (3 patients out of 80) which was slightly higher than the prevalence rate of HBV infection which might be due to the availability of HB vaccine in the national vaccine program while there is no vaccine for HCV till the current day in the entire world. The prevalence rate of HCV infection in patients with thalassaemia in Zabol city of Iran; another neighboring country, was 8.5% [12] which was higher than the current study which might be due to higher prevalence in general population in Iran (0.5%) [13] comparing with Ad-Diwanyah population (< 0.3%) [14] . Regarding to relation of gender with HBV and HCV infection, there was no significant relation between them, this result going with study of Ansari et al [16] .In the current study, there is no association between residency and infection with HBV and HCV. Also , no significant association between socioeconomic state and infection with HBV and HCV. This result had been agreed by Ghufranud Din's et al study in Pakistan [17].

Conclusions

Prevalence of HBV and HCV infection is more in multitransfused beta thalassemia major patent than in the general population. Measures taken in the blood preparation and checking still not enough to prevent infections transmitted by blood transfusion. Risk of having HBV and HCV infection in multitransfused patients increase with progression of age. There was highly significant association personal and family history of HBV and HCV infection.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the College of Medicine/ University of Al-Qadisiyah and all experiments were carried out in accordance with approved guidelines.

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