Prevalence of Hepatitis B and Hepatitis C Virus Infections in Beta Thalassemia Major Patients in Misan Governorate –Iraq

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Abstract :

Patients that infected with beta-thalassemia major (BTM) are more susceptible to infect with blood-borne virusesas a result of a need for regular blood transfusions. Of these infections , hepatitis B virus (HBV) and hepatitis C virus (HCV) are extremely significant .Aim of this study wasto estimate the number of thalassemic patients that infected with hepatitis (HBV,HCV) in Misan city and to investigate the association of these infections with age, gender, residency, blood group, splenomegaly, and splenectomy in this group of patients. The present result showed that out of (302) beta thalassemic majorpatients that included in this study, there is no infection with hepatitis B virus (HBV) .While, only 20%(61/302) were positive for HCV infection that distributed according to age that range from(3-41) years with mean-SD (21.5± 8.9).According to gender, it showed32(52%) patients were male and 29(48%) were female. According to residency, Rural group constituted 40(66%) ,but urban was 21(34 %) .HCV-thalassemic patients group was significantly associated with age and residency at(P <0.01).Also, splenomegaly rate was (59%)and splenectomyrate (43 %) were increased relatively in this group. Besides, blood group O possess higher percentage of HCV infection which was (34%) and less percentage was withgroup-**AB** constituted(7%).In this study ,high presence of hepatitis C virus (HCV) was existed in beta-thalassemia major (BTM) in comparable to hepatitis B virus (HBV).Therefore,it can be included to an urgent need to conduct more accurate tests for the purpose of ensuring that the transfused blood is free of blood –borne viruses that could be transmitted to beta-thalassemia major (BTM) patients unintentionally to save their lives.

Key words :Beta Thalassemia major,Blood –borne viruses,BTM ,HBV and HCV.

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1.Introduction

Southeast Asia are often more likely to be have alpha thalassemia. while people from Mediterranean, African, and Southeast Asian origin are more likely to have beta thalassemia (4). Clinically Beta-Thalassemia is classified based on the severity of the disease into three major subgroups: asymptomatic β-thalassemia, moderate β-thalassemia, and β-thalassemia major (BTM) which is regarded as the severe form of thalassemia(5).

The β-thalassemia major represents a severe disorder that required life-long blood transfusion and is associated with many complications such as hypothyroidism, hyperparathyroidism, hypogonadism, diabetes mellitus, cardiac dysfunction, weak growth, and liver disease(6).

Thalassemia is one of the most common genetic-related illnessescaused by a deficiency in synthesis of alpha(α) or beta(β) of hemoglobin (Hb) chains that leads to ineffective erythropoiesis. Anemia develops at an early age as a result of decreased hemoglobin production, which required regular blood transfusions to maintain hemoglobin levels. Thalassemia affects 4.4/10,000 live births of the world population, while in Iraq the prevalence of thalassemia is around 35.7 per 100,000 (1,2,3).

There are two forms of thalassemia disorders: alpha thalassemia and beta-thalassemia, both of which induce anemia in varying degrees, ranging from moderate to life-threatening. People with ancestors from Africa and

three years if they do not receive blood transfusions regularly. Iron deposited from

Beta-thalassemia major causes death in infected children before they reach the age of

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generation of enzyme-linked immunosorbent assay (ELISA). All the entered data was analyzed by using of SPSS version 23. Data was categorized as mean and standard deviation (SD).Percentages and numerical data number were usedin order to express summary statistics. Mann-Whitney Test and Kruskal-Wallis were applied where necessary and p value of less than ($p < 0.05$) was considered as significant. .

3.Results:

The study included 302 Beta –thalasemic major patients in order to investigate of hepatitis B and C among this group . Patients distributed according to age ranged from years ,gender, splenomegaly, splenectomy, blood group and residency. Our result showed the percentage of HCV-Thalassemic patients was 20%(61/302).While, there is no infection with HBV in thalassemic patients group 0%(0/302).(Table1)

According to age (3-41) years, HCV-Thalassemic patients are divided into three groups .The group-B (16-30) years has the highest percentage 34(56%) ,group-A(3-15) was 17(28%) and group C(31-41) was 10(16%) with SD. Mean of age 21.5± 8.9 with ($P < 0.01$). According to gender ,the result showed that males group has the highest percentage which constituted 32(52%) patients in comparison to female 29(48%) .Also the present study showed that rural group has the highest percentage constituted 40(66%) patients, while the urban constituted 21(34 %) with ($P < 0.01$).(Table2) .

While, according clinical picture ,with regarded to splenomegaly, the present study showed that infected group has the highest percentage constituted 36(59%) patients, while the other constituted 25(41 %) patients. According to splenectomy the present study showed that patients without splenectomy group has the highest percentage constituted 35(57%) patients, while the other group constituted 26(43 %) patients.

transfused red blood cells can lead to organ failure, even though transfusions can save death and reduce mortality. Iron chelation therapy is regarded as a required adjuvant therapy for patients with BTM to reduce iron stores in the body and increase long-term survival rates(7). .

Regular blood transfusions, on the other hand, make patients that infected with major beta-thalassemia aremore susceptible to infection with blood-borne illnesses such as infections with the hepatitis B virus (HBV) and hepatitis C virus (HCV)(8).

After a blood transfusion, the hepatitis B and C virus infections can lead to causeliver fibrosis and cirrhosis, which in turn lead to increasing of mortality and morbidity in thalassemic patients. Chronic infection with HCV occurs in a significant number of people,especially in eastern Mediterranean region which ranges from 11-69% in patients with thalassemia major . the percentage varies according to the difference in age of the patients and the region in which the virus is distributed (9).

The objective of this study was to estimate the distribution of HBV and HCV in thalassemic patients in Misan city and to evaluate the necessity to Apply safe blood transfusion procedures.

2.Patients and Methods

This a cross -sectional study was carried out in department of thalassemia in Misanheath directorate in Misangovernorate –Iraq , from Dec-2021 April 2022.The study involved people who have been getting transfusion and registered in the –Pediatrics. The patient's parent provided valid consent to the department.Ethical concerns were addressed. Their demographic status including gender, age , numbers and theirHBV vaccination data was recorded and submitted on a pre-made questionnaires.Under aseptic conditions, about (3-5ml) of venous blood was drawn and collected into a serum vial.A blood sample was taken and submitted to laboratory for detection of HBs-Ag and anti HCV- AB by using 3rd

According to the present study showed that infected (O) group has the highest percentage constituted 21(34%) patients, (group-A) 17(28%),(group-B) 19(31%), while the (group-AB) constituted 4(7 %) patients.(Table 3) .**Table 1:Prevalence of hepatitis infection in thalassemia patients**

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Type of infection	Result	Number	Percentage
1-Hepatitis C	Positive Negative	61/302 241/302	**(20%)** **(80%)**
2-Hepatitis B	Positive Negative	0/302 302/302	**(0%)** **(100%)**

Table 2:Sociodemographic data of HCV-Thalassemic patients group.

Mann-Whitney Test and Kruskal-Wallis and –(*) HS (Highly Sig. at P<0.01) , S(Sig. at P<0.05) , NS (Non – Sig. at P>0.05)

Table 3:Clinical picture of HCV-Thalassemic patients group.

Variables	Groups	Frequencies	Percentage	
Some related variables	**Groups**	**Frequencies**	**Percentage**	**P-Value**
1-Age	3-15 16-30 31-41 M-SD	34 17 10 21.5± 8.9	(56%) (28%) (16%)	**P<0.01** **(*) HS**
2-Gender	Male Female	32 29	(52%) (48%)	**P> 0.05** **NS**
3-Residency	Urban Rural	40 21	(66%) (34%)	**P<0.01** **(*) HS**
4-Duration of disease	(1-9y)	M-SD4.2±2.7		
1-Splenoctomy	Yes No	26 35	(43 %) (57%)	
2-Splenemegaly	Yes No	36 25	(59%) (41 %)	
3-Blood group	A B AB O	17 19 4 21	(28%) (31%) (7 %) (34%)	

4.Discussion :

synthesis of betaglobin chains(β)develops beta thalassemia.globin chain abnormalities impede hemolysis and erythropoiesis,with phenotypes ranged from severe anemia to patients who are clinically asymptomatic(4).

Thalassemia is a set of hematologic diseases that are passed down through the generations that are caused by errors in the production of one or more hemoglobin chains. Defective in synthesis of alpha globin chains(α)develops alpha thalassemia, whereas defective in

factors, allowing iron to impact chronic hepatitis progression(16,17).

Due to the increased use of HBV immunization and its important contribution to disease prevention, the incidence of hepatitis B virus (HBV) infection has reduced in this group of patients. While, because of lack of an HCV preventive vaccine, hepatitis C remains a severe concern in thalassemia patients(18).

This result was lower than result of (69%) in Dohuk–Iraq(19) , (42.5%)in Basra-Iraq(20),(26.4%) inDiyala-Iraq(21**),**(51.3%) Pakistan (22),(29.0%) in Egypt (23) and(28.1%) in Iran (24).While, this result was more than result of (15.40%) in Thi-Qar-Iraq (25),(3.8%) in Al-Diwanyiah city-Iraq(26**),**(20.8%) in Pakistan (27)and(13.1%) in Pakistan (28**).**On other hand ,our result showed no infection with HBV in thalassemic patients .This result was less than (0.47%) in Thi-Qar province-Iraq(29), (22.5%) in Sulaimani Governorate-Iraq(30),(2.5%) in Al-Diwanyiah city-Iraq (26),(0.8%) in India(31),(19%) in Jordan (32) andIn Iran (3.8%)(33).

According to present study, the differences between these results could reflect variation in population size and medical procedures that followed in different countries .Prevalence of HCV-HBV in thalassemia patients refers to present of this virus into blood that frequently supplied to thalassemia patients.There is a direct proportion between the increase in number of blood transfusions and the high incidence of infection with age. As for the increase in infection in the rural area, it may be due to poor health awareness or the lack of health measures necessary to preserve the lives of thalassemic patients

With regarded to beta thalassemia that include three types thalassemia major, thalassemia intermedia, and thalassemia minor ,the Individuals with thalassemia major(BTM)are usually develop severe anemiarequiring regular transfusions during their first two years of their life. Retardation of growth, jaundice, pallor, poor musculature, hepato-splenomegaly, ulcers in legs, development of, heartextra medullary erythropoiesis masses, failure and arrhythmias and skeletal changes that result from enlargement of bone marrow are shown withinIndividuals with thalassemia major who have not been treated or who have been improperly transfused, as observed in several undeveloped nations(10,11).

Repeated transfusions, on the other hand, result in iron overload, which can lead to serious complications such dysfunction of endocrine, cardiomyopathy, hepatic disease, and, eventually, premature death. Patients with beta-thalassemia major(BTM) die within the first five years of life if they do not receive transfusions, and even with transfusions, only 50–65 percent of patients live to be 35 years old. Patients who have blood transfusions on a regular basis are at risk of contracting hepatitis(12,13,14).

Patients with thalassemia are predisposed to blood-borne microbiological infectious diseases such as hepatitis B and C, among other consequences resulting from recurrent blood transfusions. This could impair the health and well-being of thalassemia patients, as well as increasing morbidity and death(15).

Most infected patients develop liver fibrosis, cirrhosis, and hepatocellular carcinoma as a result of chronic hepatitis due to infection with hepatitis B or C. Hepatic iron concentrations are modestly to moderately elevated in HCV patients, with severe hepatic iron overload occurring on rare occasions. The Increasing in storage of iron may come from release from damaged liver cell, the viruses itself, or genetic

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from the risk of contracting hepatitis infection. Blood transfusion error reflects on this group and HCV-infection make them more suffer from complication of viral hepatitis infection.

Chronic hepatitis in most of infected patients can lead to the development of hepatic fibrosis, cirrhosis and liver carcinoma(34) .Besides, splenomegaly and splenoctomy could occur with high rate(35,36).Patients with HCV have middling increased in hepatic iron concentration and sometimes have severe hepatic iron overload which in turn lead to causes of organ damage and increased mortality so that the iron can influence the progression of chronic hepatitis C(37,38).To avoid HCV-transmission among thalassemia patients, the blood screening process should performed properly. This include using of PCR technique beside Elisa to confirm the presence or not of hepatitis viruses into blood before blood transfusion process..

Authors' Contribution

Study concept and design: M. A. S
Acquisition of data: M. k.
Analysis and interpretation of data: M. A. S.
Drafting of the manuscript: M. A.S
Critical revision of the manuscript for important intellectual content: M. K.
Statistical analysis: M. A.S
Administrative, technical, and material support. M.M.

Ethics

The study protocol was approved by medical laboratory techniques department , Al-Manaracollege for medical sciences .

Conflict of Interest

The authors declare that they have no conflict of interest.

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