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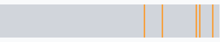
2	**pmc.ncbi.nlm.nih.gov** | Lock https://pmc.ncbi.nlm.nih.gov/articles/PMC9036341/ **2 similar sources**	3%		Identical words: 3% (96 words)
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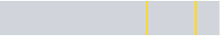
4	**dx.doi.org** | Prevalence and Risk Factors of Hepatitis B and Hepatitis C Virus Infec... http://dx.doi.org/10.36347/sjams.2023.v11i01.010 **2 similar sources**	1%		Identical words: 1% (46 words)
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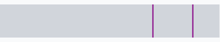
2	**doi.org** https://doi.org/10.1371/journal.pone.0135281.s015	< 1%		Identical words: < 1% (31 words)
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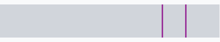
4	**share.google** https://share.google/XMlWU4eyORtABLCKe	< 1%		Identical words: < 1% (21 words)
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Points of interest

Estimation of Blood-Borne Virus Infections in Beta Thalassemia Major Patients in Al-Diwanyah Governorate–Iraq

ABTRACT

Background: Thalassemia is a heterogonistic group of ancestral anemia produced by mutations damaging the globin- chain structure in subunits of hemoglobin molecule. This typically leads to insufficient hemoglobin synthesis and the assembly of insoluble non -paired chains that harm blood cells, resulting in non-effective erythropoiesis and hemolytic anemia illness. Thalassemia suffering patients usually require lifelong blood transfusions protocol, which may lead to acquire infection with blood-transfer viruses such as (hepatitis B and C virus) accidentally, which in turn will lead to the deterioration of the patients' health. The aim of present study was to estimate the frequency and distribution of hepatitis viruses in thalassemia patients and its association with thalassemia form, transfusions, spleen state, and some socio-demographic properties. Material and method: This cross -sectional study conducted in the hematology center of Al-Diwaniyah health department, Al-Diwaniyah governorate. Present study extended from February to august 2024. Total of (328) thalassemia patients were enrolled. Age, sex, and number of recorded blood transfusion. Around 3-5ml vein blood drawn and sent to the hematology center laboratories for detecting of hepatitis viruses by ELISA. Data entered in SPSS 20 and analyzed for frequencies. Result: Overall 328 patients were enrolled in the study, out of this 3/328(0.9%) were positive for hepatitis C virus infection with $p < 0.07$, While only 1/328(0.3%) patients were hepatitis B virus surface antigen positive with $p < 0.5$ with (CI -1.95-1.97),equal infections were distributed for both of males and females, most of infections were concentrated in urban other than rural (2.9% vs 0.04%),whereas maximum of infections occurred into adult and younger age (16-25 years),all hepatitis infected-patients were receive blood transfusion twice monthly with rate 4/98(29.9%), most of patients had relative low education level, low income, only one infected patient undergone splenectomy. Conclusion: The study revealed that the existence of both HCV and HBV infection in multi-transfused thalassemia patients. The risk of acquiring of HBV and HCV infection increases with the progression of patient’s age especially with HCV. There was a correlation between increasing number of blood transfusions across different thalassemia patients and hepatitis viral infections.

Keywords: Thalassemia, hepatitis C virus, hepatitis B virus

INTRODUCTION

Thalassemia is a hematological disorder that caused by mutations in the genes that encode hemoglobin chains, which leads to inefficient erythropoiesis process. Mutations in the βeta-globin genes are the most frequent cause of inherited disorders in humans, with 350 βeta-thalassemia variation identified to date Aziz et. al., (2022).

The World Health Organization (WHO) estimated that, worldwide, 40,000 infants yearly are born already with thalassemia illness, and most of this group have βeta-thalassemia form. Most children suffering from thalassemia are born usually in low- and in middle-income countries population Ahmed et. al., (2021).

The prevalent of β-thalassemia differs geographically, with higher prevalence existed in specific regions. There is a high rate of βeta-thalassemia in the Mediterranean area (like Greece, Cyprus, and Italy), the Middle East area (e.g. Iran and Iraq,), and some other territories of Asia (e.g. Pakistan, Bangladesh, and India) Rao et.al., (2021).

In Iraq, thalassemia represented 75% of all hemoglobinopathies inherited disorders, Iraq presently calculated total of (13390) reported cases of thalassemia, leading to frequency of (3.4/10000) cases. Abd Hussein et. al., (2024).

Two types of thalassemia illnesses are found: alpha and beta-thalassemia form, each of them trigger anemia in different grades, extending from mild to potentially fatal affect Herbert et. al., (2009).

Beta-thalassemia illness (β-thalassemia) possess double medically important forms, Beta-thalassemia major intermedia, resulted from lack or decrease synthesis of the hemoglobin subpart beta (beta globin molecule chain) Langer et al, (2000).

Patients contacting beta-thalassemia major (BTM) have extreme chronic hemolytic anemia which require continuous blood transfusions start with early childhood. Continuous blood transfusion treatment is usually associated with iron chelating treatment to prevent serious consequences resulted from iron overdose, as in heart-related morbidity, diseases of liver, disorders of endocrine Kattamis et. al. (2020).

Regular blood transfusions regarded as common treatment for BTM to improve health condition and enhance their survival opportunity , but on other hand ,make thalassemia patients more capable to acquire infection with blood-transfer diseases such as hepatitis viruses (Khalil et.al., (2016);Mandal et. al., (2024)).

Infections with hepatitis viruses regarded amongst the high eight reasons of fatalities, with around 1.34 million annually fatalities worldwide. It evaluated around 257 million individual are contracting with HBV and 71 million person with hepatitis C virus (HCV) chronically. These diseases known as silent killer due to many of infected patients could stay undetected and non-treated for long time prior to their health consequences getting worse Ahmed et. al., (2021).

Post-transfusion viral hepatitis has considerably involved to morbidity in thalassemia patients with elevated risk for progressing of life- threatening issues Mukherjee et. al., (2021). It revealed that the second typical cause of mortality in thalassemia major patients over fifteen years of age was liver disease, due to complications of viral hepatitis Al-Sharifi et. al. (2019). Chronic HBV or HCV infections can affects the liver, people with chronic hepatitis are at high risk of: chronic liver disease, cirrhosis, liver cancer Cropley et. al., (2017).

The aim of present study was to calculate the circulating of HBV and HCV in thalassemia patients with regard to age, sex, residency, and other socio-demographic variables in Al-Diwanyah province and to quantify the requirments to perform safe transfusion protocols

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METHOD

Present study is a cross-sectional, performed in the hematology center of Al-Diwanya Health Department, Al-Diwanya governorate,Iraq. Present study extended from February to august 2024.The number of beta thalassemia patients that enrolled into present study was (328) patients. The data which registered for all patient contain age of person,sex, period of the illness, history of family with thalassemia, thalassemia form either major or intermedia, numbers of transfusing, state of spleen, history of family with hepatitis viruses infection if any, and vaccinating records. Approximately 3-5ml of vein blood taken and put in a sera tubes under aseptic procedure and screened into labs of center for Hematology for detection of HBsAg and anti-HCV Antibodies by third generation ELISA. All the data was entered and analyzed in (SPSS) to recognize the relationship between infections and age of patients, sex and frequency of transfusions.

RESULTS AND DISCUSSION

Out of (328) beta thalassemia patients that included in this study only 4/328(1.2%) patients showed positive infection with both of HCV and HBV, the result showed higher positive cases for hepatitis C virus infection 3/328(0.9%) than 1/328(0.3%) patients were hepatitis B virus surface antigen positive with (CI -1.95-1.97) and without significant statistically at value of $p < 0.05$. The current study also shows that the infection rate with hepatitis C and B viruses has increased within the specific age group C-(16-25 years), as shown in table (2). Besides, study also showed that the rate of infection with hepatitis virus into thalassemia patients is equal for both males and females, as shown in Table (3). This study also showed an increase or concentration of hepatitis infections in urban areas rather than rural areas , as shown in table no (4). Also, this study showed all hepatitis infected-patients were receive blood transfusion twice monthly with rate 4/98(29.9%) according to treatment protocol. As below in table no (5). Moreover, for other socio-demographic variables the study showed most of patients had relative low education level, low income, only one infected patient undergone splenectomy,as that shown in table no (6).

Table 1. Distribution of Hepatitis-Thalassemia patients concerning type of virus

Confidant interval-CI

P -value
Positive percentage %

Negative No
Positive No
Types of viruses

1.95-1.97

0.07

3/328(0.9%)
325

3

HCV

0.5

1/328(0.3%)
327

1

HBV

-
4/328(1.2%)

328

4

Total

Table 2. Distribution of Hepatitis-Thalassemia patients concerning age

Age	Thalassemia positive	Percentage per –age	HBV-positive percentage	HCV-positive percentage
A-≥5	61/328	19%	-	-
B-6-15	148/328	45%	-	-
C-16-25	92/328	28%	1/92(1.1%)	2/92(2%)
D-≤26	27/328	8%	-	1/27(3.7%)
Total	328	100%	1/328(0.3%)	3/328(0.9%)

Table 3. Distribution of Hepatitis-Thalassemia patients concerning to sex

percentage %	Female	Percentage%	Male	Sex
1/158(1.3%)	2	1/170(0.6%)	1	HCV
0	0			

1/170(0.6%)
1
HBV

-
2
-
2
TOTAL

Table 4. Distribution of Hepatitis-Thalassemia patients concerning residency

Percentage
Total ratio of positive /negative cases
Hepatitis virus- Positive cases
Total ratio
Residency

(2.9%)
3/103
2

1
103/328
Urban

HCV

HBV

(0.04%)
1/225
1

0
225/328
Rural

HCV

HBV

Table 5. Distribution of Hepatitis-Thalassemia patients concerning transfusion number

Percentage
Hepatitis patients -transfusion no.
Percentage
Ratio
Transfusion no.

0
0
60%
200/328
1 time

4%
4/98
29.9%
98/328
2 times

0
0
7.3%
24/328
3 times

0
0
1.8%
6/328
times4 ≥

-
-
100%
328
total

Table 6. Distribution of Hepatitis-Thalassemia patients concerning socio-demographic variables
Percentage %
hepatitis- thalassemia patients-ratio

Variables

Education

0.6%
2/328
primary

0.6%
2/328
secondary

-
0
graduated

Employment status-fund

0.3%
1/328
Employed

0.9%
3/328
Un employed

Marital status

0.6%
2/328
Single

0.6%
2/328
Married

Past surgery

0.3%
1/328
Yes

0.9%
3/328
No

Present study shows a relatively noticeable prevalence of hepatitis virus infections among thalassemia patients 4/328 (1.2%), whereas the infection rate with HCV is higher than with HBV, this may be due to the lack of an effective vaccine against hepatitis C virus Ansari et. al., (2012) and May due to the relative higher incidence of this virus within the local community compared to HBV.

Present result with regarded to HCV showed 3/328(0.9%) positive cases into beta thalassemia patients so it was lower than results of (69%) in Dohuk Arwa et. al., (2019), (42.5%) in Basra Najim et. al., (2018), (26.4%) in Diyala Raham et. al., (2011), (10.89%) in Misan Hassan et. al., (2024), (24.2%) in Wasit Muslim (2014), (26%) in Baghdad Ali (2018), (12.1%) in Diyala Al-Zuheiry (2016), (25%) in Babylon Muhsin and Abdul (2013), (37%) in Karbala Al-greti (2013), (15.98%) in Thi-Qar Al Badry (2015)
On other side present result revealed (0.3%) positive cases with HBV in thalassemia group, so, it was fewer than (0.47%) in Thi-Qar governorate Othman and Abbas (2020), (22.5%) in Sulaimani province Hama and Sawa (2017).

This decreasing frequencies into group of beta thalassemia patient contracting hepatitis infections in Al Diwanyah province in comparable to other Iraqi governorates may refers to overall decreasing of hepatitis infections in local community, providing of proper medical services and medical surveillance from local health authorities.
With regarded to age, concentration of hepatitis virus infections in specific age groups among thalassemia patients—particularly adolescents and young adults—is the result of cumulative exposure regularly, frequency of transfusions, immune response state, and healthcare and tests evolution over time (Origa (2023); Jang et. al., (2017)). This may be attributed to the fact of both sexes are exposed to the same health risks exposure when undergoing blood transfusions rather than biological differences between them Altaf and Hussain (2025).

According to residency in this study, the reason for the increase in infections with hepatitis viruses in urban areas compared to rural areas may attributed to the relative high population density in those areas and thus the increase in the rate of horizontal transmission of such infections, or due to the increasing migration to cities. It may also be due to the risks of behavior and mishandling of waste or procedures of health facilities, as well as due to the limited access to proper diagnosis in rural areas Reyes et. al., (2012); Anticona et. al., (2015)).

This study also showed that the rate of infection with hepatitis virus was concentrated in patients who received blood transfusions twice a month، unlike the rest of the groups whose rates of blood transfusions ranged from once to more than four times monthly, this may be due to the infection concentration in this category of patients because relatively large numbers, and the increased frequency of blood transfusions they receive on a monthly basis, which exposes them to greater risk of catching infection.

Concerning socio-demographic criteria, this study showed that the level of education among the current group of patients ranged between primary and intermediate, and this level may not provide the patient with the necessary or adequate knowledge to maintain health condition and to avoid contracting viral infections transmitted through the blood Raguphati (2020). It also note the lack of adequate financial support provided to patients may negatively affect their ability to monitor and improve their health condition properly Okunrintemi et. al., (2019). The study also showed that half of the hepatitis patients in this group were already married, which indicates the risk of transmitting such viral infections to their families.

The study also showed that only one patient with HCV had to have his splenectomy to reduce transfusion frequency and so iron overload burden Farmakis et. al., (2022).

CONCLUSION

Despite the relatively low incidence of hepatitis among thalassemia patients in Diwaniyah Governorate compared to other governorates, more efforts are required to prevent the transmission of infection to this group by applying strict standards for blood donation, conducting more advanced and reliable regular tests for transfused blood, applying the best health safety standards for patients , this incorporates using of PCR method along with Elisa to confirm the infections ,raising the cultural level of patients to know methods of avoiding infection, and provide adequate therapy with antiviral medication to decline the incidence and complications of hepatitis infections .

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�There is no need to specify the research site; the research location is described in the methods section

�The abstract is too long; please make it more concise and focus on the core of the study

�The background section should be refined by clearly articulating the rationale for selecting thalassemia as the research topic, in order to demonstrate the urgency and significance of the study.”