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Prevalence of HBV, HCV, HIV, and Thalassemia among People Attending Premarital Screening Centers in Diyala, Governorate, 2015-2018

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Abstarct:

Background: Viral hepatitis is a serious global public health condition, affecting millions annually. Globally, more than a half billion persons are chronically infected with hepatitis B virus or hepatitis C virus which is over 10 times the number infected with HIV/AIDS.

Aim of the study: This study aimed to measure the prevalence of HBV, HCV and Thalassemia among people attending premarital screening centers in Diyala, determine the trends of HBV, HCV and Thalassemia in premarital screening centers in Diyala from (2015-2018) and to study of HBV, HCV and Thalassemia in Diyala will lead to revise the control methods to reduce morbidity and mortality.

Materials and Methods: From the 1st of September 2018 to the end of May 2019, a cross-sectional study was conducted in primary schools in the rural Makhmur district and urban districts of Erbil Governorate. A sample for bacterial culture was obtained in every suspected case of clinical conjunctivitis by winding a thin cotton microswab moistened in brain heart infusion broth over the lower fornix of the conjunctival sac. The colonies were specified and identified after culturing on blood, chocolate, and MacConkey agars using the Gram staining technique and morphological, biochemical, and analytical profile index (API) tests. Clinically, allergic conjunctivitis was diagnosed. The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire in Kurdish and Arabic was used. SPSS and the MS Excel package

Results: The total number of schoolchildren who participated in this study was 1129 in the city and 1093 in the country. The prevalence of infective conjunctivitis in both urban and rural children was 127(11.2%) and 211(19.3%), respectively. Positive culture was found in both urban and rural areas, with urban having 69.3% and rural having 143.8% (p 0.01). Staphylococcus aureus was the most commonly isolated pathogen, with 37 (53.6%) isolated in cities and 79 (55.2%) isolated in rural areas. Infective conjunctivitis was more common in young people and among male students (p0.05).Concerning allergic conjunctivitis, the prevalence was as follows: urban 247(21.9%), rural 81(7.4%).Allergic conjunctivitis was more common in older people and boys, but this was not statistically significant. Every student complained about itching.

Conclusion: Infectious conjunctivitis among rural school children is still a major public health problem. While higher percentage of allergic conjunctivitis among urban school children was noted.

Key points: thalassemia, hepatitis, HIV, premarital screening centers, Diyala.

Introduction:

Viral hepatitis is a serious global public health condition, affecting millions annually.

Globally, more than a half billion persons are chronically infected with hepatitis B virus or hepatitis C virus which is over 10 times the number infected with HIV/AIDS, annually, approximately 1 million people die from these infections, and what makes the situation worse is the fact that a large proportion of those infected do not know that they carry the virus. (1)(2). In Iraq, the viral hepatitis national surveillance program was established since the seventies of 20 century, different types of hepatitis have different rates of prevalence, hepatitis B 1.6%, hepatitis C 0.4% (3). Understanding the epidemiology is very important, and these diseases (hepatitis B, C transmitted sexually d thalassemia is genetic disease so premarital screening is very necessary. Hepatitis is a viral infection of the liver can cause both acute and chronic disease (4). It is mainly transmitted between people through contact with infected blood, or other body fluids frequently from mother to baby in-utero (5). Hepatitis B is a significant occupational threat for health care workers. (6). Hepatitis B caused 887000 fatalities in 2015, the majority of which were sequelae (liver cirrhosis and hepatocellular carcinoma (7). In adults 5% from infected persons developed chronic infection, and 20_30% from persons with chronic infection will develop complications like cirrhosis and liver carcinoma. (5,6,7,8). Hepatitis B diagnosed by blood tests to confirm and monitor the infection, acute HBV infection is characterized by presence of HBVa an immunoglobin M (IgM), and chronic infection by immunoglobin G(Igg) (8,9,10,11). No specific treatment available to HBV, However, it is preventable with a currently available safe and efficacious vaccine (12,13,14). Hepatitis C is a viral illness of the liver caused by the hepatitis C virus; it presents little symptoms (15). This is the duration between the first exposure and the onset of the disease; it might last from 14 to 80 days on average (16,17). Anti-HCV antibodies, HCV RNA, and liver function tests to evaluate protein and enzyme levels are used to diagnose Hepatitis C (17,18). There is no recommended treatment for acute infection, but there are several medications for chronic infections (inferon and ribavirin) (18). Thalassemia is a blood condition, with few red blood cells and less hemoglobin (19). Thalassemia is genetic (19). There are two types of thalassemia (major, minor) (20,21,22). Thalassemia diagnosed by CBC and hemoglobin electrophoresis (23). For mild cases no treatment need, for serious cases blood transfusion is needed (24). This preset study aimed to measure the prevalence of HBV, HCV and Thalassemia among people attending premarital screening centers in Diyala, determine the trends of HBV, HCV and Thalassemia in premarital screening centers in Diyala from (2015-2018) and to study of HBV, HCV and Thalassemia in Diyala will lead to revise the control methods to reduce morbidity and mortality.

Methods & Methods:

Study protocol:

A descriptive cross-sectional study was conducted in the five premarital screening centers, the Public Health Department and Public Health Laboratory - Diyala Health Directorate - Diyala Governorate during the period from March to August, 2019. Diyala province is a governorate in eastern Iraq, its capital is Baquba, it covers an area of 17,685 km^2, its population about 1,443,200, contains five health district “Baquba, ALmuqidadiya, Khanqein, Baladruz and Alkalis”, five premarital screening centers and nine hospitals.

Ethical considerations:

Administrative approval will be obtained from the directorate of Public Health/ MOH and the Diyala Directorate of Health. Administrative approval will be obtained from the managers of the premarital screening centers in Diyala. All personal patients' information will be kept confidential

Study population:

Inclusion criteria in this study were all children in the selected schools of aged 7-12 years while exclusion criteria were eye trauma, recent eye surgery, patients who are on systemic, local antibiotic and chemotherapy.

Case definition

Individuals were categorized as per the diagnostic criteria;

1. β -Thalassemia trait, when they had low red cell indices, normal or high serum ferritin, and HB A_2 >3.5 on HB electrophoresis.
2. α-Thalassemia trait; when they had low red cells indices, erythrocytosis (red blood cells (RBC) >5, normal or high serum ferritin, and normal HB electrophoresis pattern (this diagnosis still presumptive).
3. HBV diagnosed by antigen in blood (HBs Ag).
4. HCV diagnosed by antigen in blood (HCs Ag).
5. HIV diagnosed by presence of antibody to HIV protein 'the current standard is enzyme linked immunosorbent assays (ELISAs) and Western blot (WB) for confirmation.

Inclusion criteria

Records of all couples attending premarital screening centers in Diyala for the period from 2015-2018 were included in the study.

Exclusion criteria

Records of couples with iron deficiency anaemia and sickle cell anaemia (as it was included separately during 2019) were excluded from the study.

Sampling Technique

Records of all couples attending the five premarital screening centers in Diyala were included in the study.

Study design:

Records of all couples underwent routine compulsory premarital testing for Thalassemia, HBV, HCV and HIV in the five premarital screening centers in Diyala; Baquba, ALmuqidadiya, Khanqein, Baladruz and Alkalis, were included in this study. In addition to the Public Health Department and Public Health Laboratory -Diyala Health Directorate.

Data Collection

- Data were obtained from:

a. The five premarital screening centers in Diyala; Baquba, AL-Muqdadiya, Baladruz, Khanaqein and AL- Khalis.

b. Public Health Department, Diyala Health Directorate and Public Health Laboratory; (Revising the monthly reports from premarital screening centers which include cases of Thalassemia, HBV, HCV and HIV).

- A data collection form was designed to collect the following information:

a. Demographic information; (name, age, sex, address, employment,

b. Consanguinity,

c. Lab result of investigation according to case definition.

- Data cleaning, merging and removing duplication were done using Microsoft Excel, 2010.

Statistical analysis:

Microsoft Excel, 2010, was used for organizing and analyzing data. Categorical data were presented as frequencies and relative frequencies in tables or suitable graphs. Chi square test was used to test the significant association between categorical variables when applicable. P value of < 0.05 was considered statistically significant.

Results:

3.1. Total Number of the Investigated Cases (2105-2018)

The total number of people attending premarital screening centers in Diyala was 98658 during the period from 2015-2018.

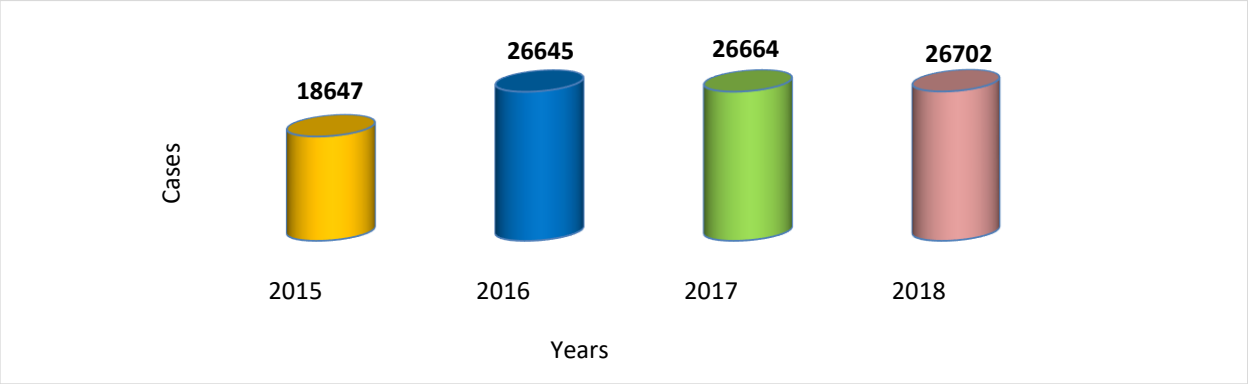

Figure 1: Total number of investigated cases (2015- 2018)

Table 1: Demographic characteristics of the studied couples

Variable	No. (N= 98658)	(%)
Age Groups (Years)		
< 20	14799	15.0
20 – 30	53275	54.0
31 – 40	22691	23.0
> 40	7893	8.0
Employment		
Employed	68074	69.0
Not Employed	30584	31.0
Marital Status		
Single	80900	82.0
Married	5919	6.0
Widow	6906	7.0
Divorced	4933	5.0
Consanguinity		
Positive	55248	56.0
Negative	43410	44.0

Table 2: Positive cases detected by screening among the examined couples

Diseases	Cases detected by screening	
	No.	%
Thalassemia	1524	84.0
HBV	239	13.2
HCV	50	2.7
HIV	2	0.1
Total	**1815**	**100.0**

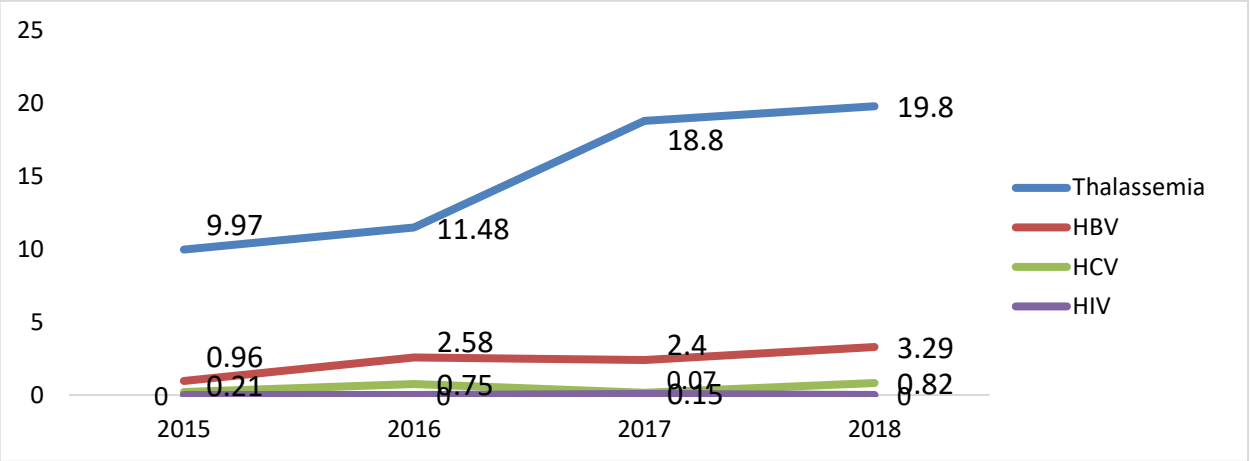

Figure 2: Prevalence of diseases (2015-2018)

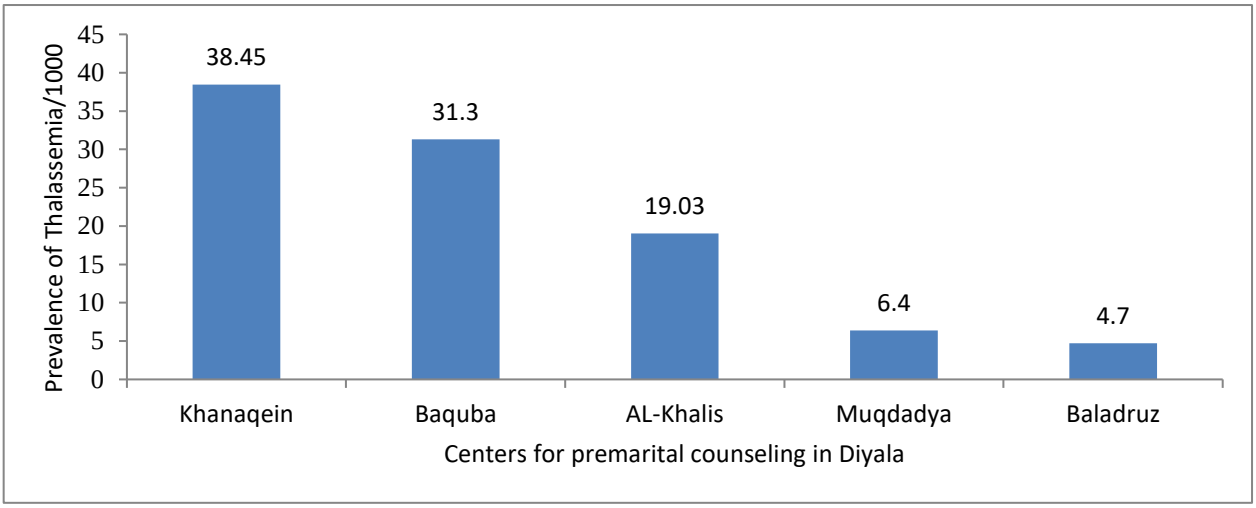

Figure 3: Prevalence of thalassemia (/1000) according to the centers for premarital counseling in Diyala governorate

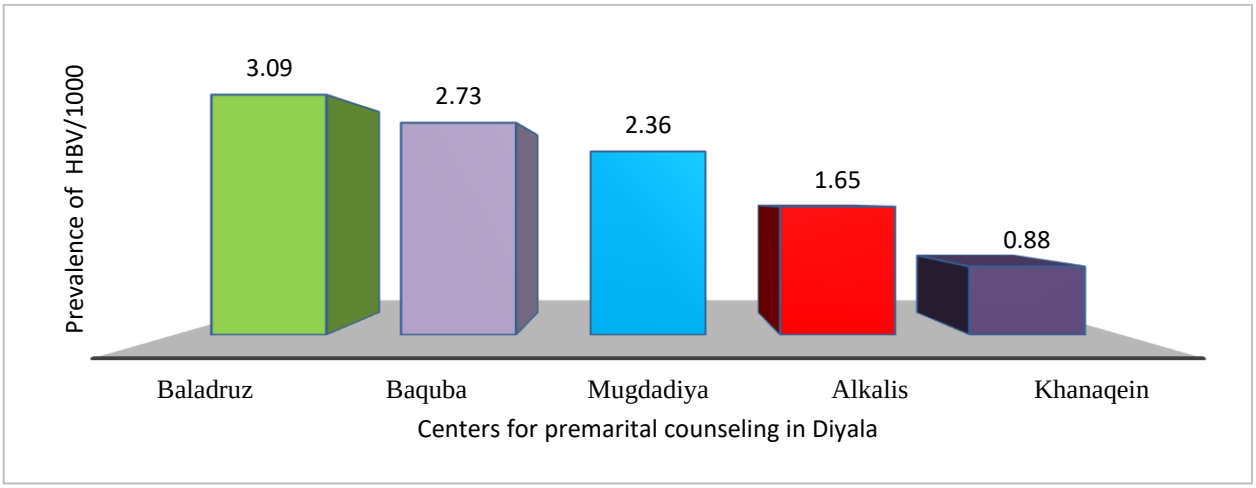

Figure 4: Prevalence of HBV (/1000) from (2015 to 2018) in the five centers

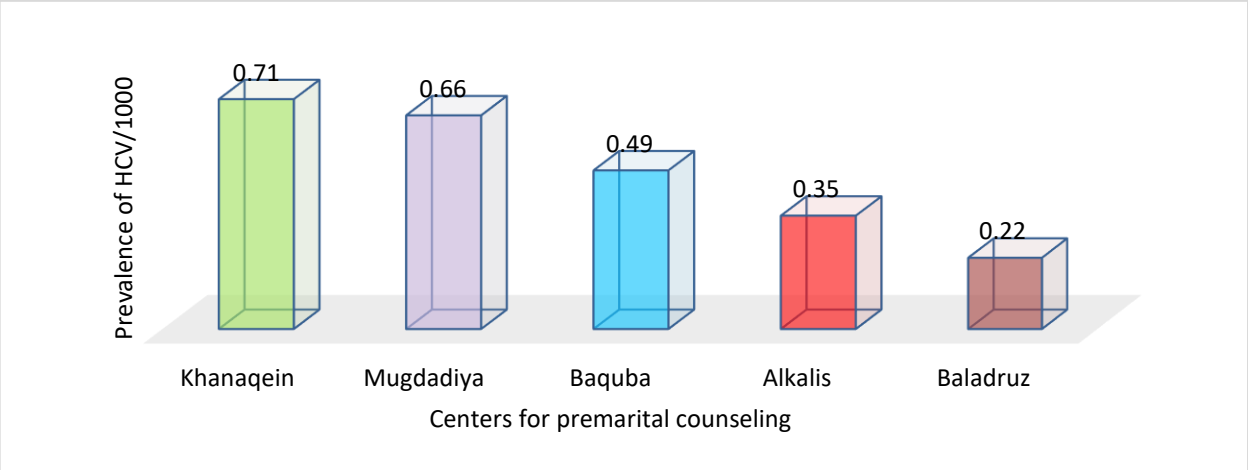

Figure 5: Prevalence of HCV (/1000) from (2015 to 2018) in the five centers

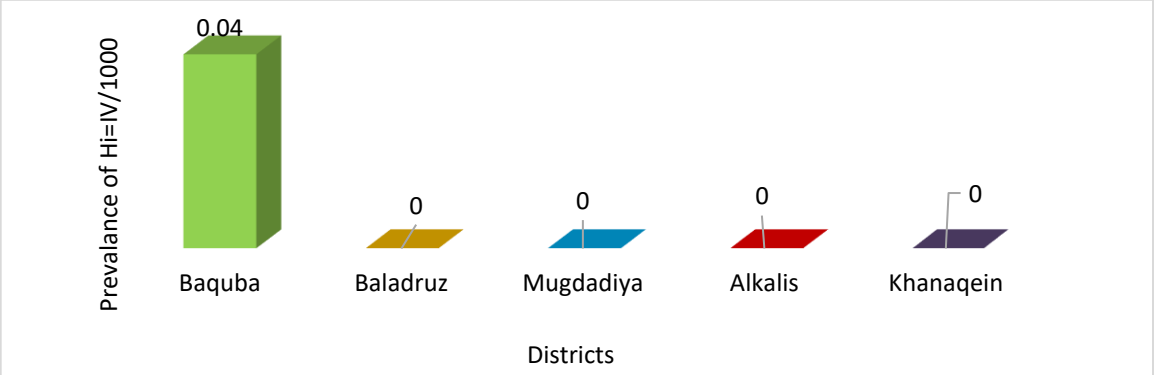

Figure 6: Prevalence of HIV (/1000) from (2015 to 2018) in the five centers

Table 3: Distribution of cases detected by screening among the examined couples by centers

Centers	Centers for premarital counseling										χ2	P Value
	Baquba		Baladruz		Mugdadiya		AL-Khalis		Khanaqein			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Thalassemia*	1524	100.0	0	0.0	0	0.0	0	0.0	0	0.0	NA	-
HBV	151	63.2	27	11.3	32	13.4	19	7.9	10	4.2	18.9	0.0008**
HCV	27	54.0	2	4.0	9	18.0	4	8.0	8	16.0	150.5	<0.0001**
HIV	2	100.0	0	0.0	0	0.0	0	0.0	0	100.0	235.6	<0.0001**

*** Testing for thalassemia from all centers is performed only in Baquba**

**** Statistically significant association (χ2, Df= 4)**

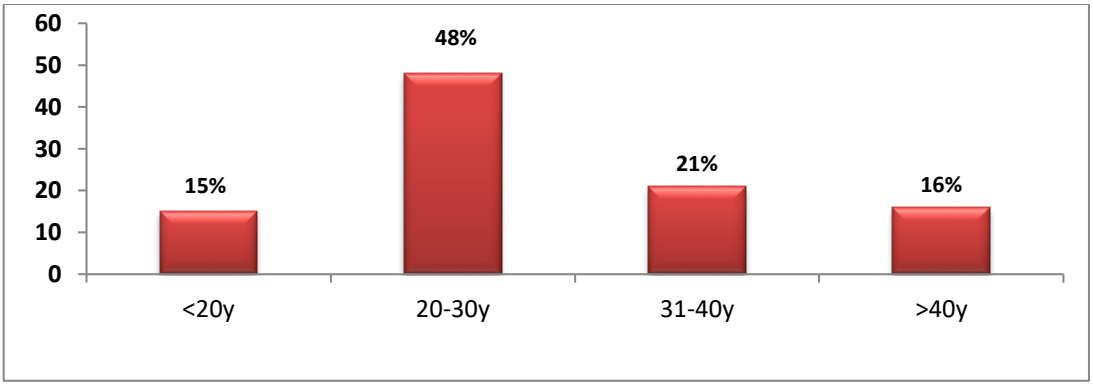

Figure 7. Prevalence of thalassemia by age group.

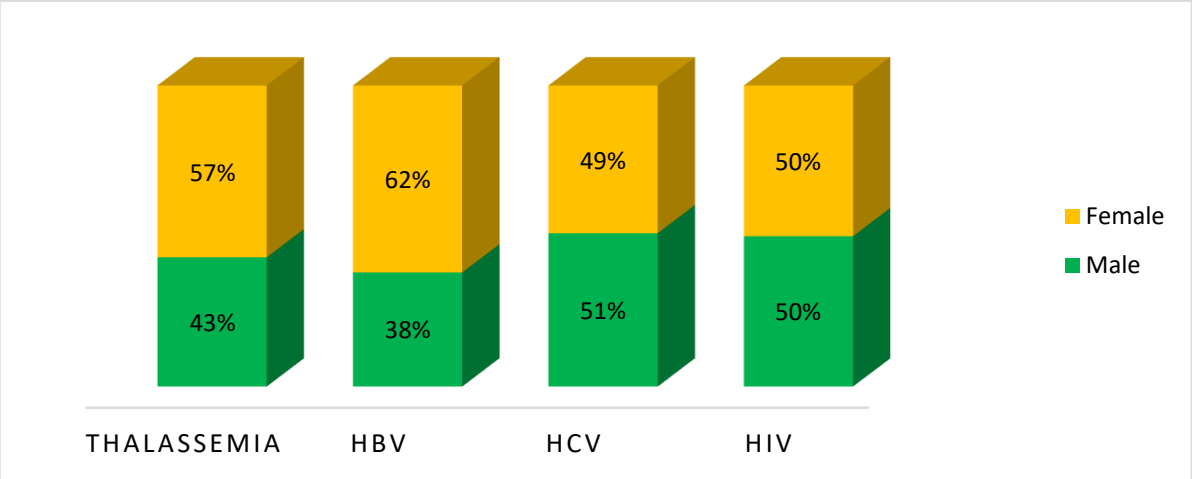

Figure 8: Distribution of positive cases of thalassemia, HBV, HCV, and HIV by gende

Table 4: Association between gender and disease

Disease	Males	Females		χ2	P Value
	No.	%	No.	%	
Thalassemia	655	43.0	868	57.0	30.26	<0.000*
HBV	91	38.0	148	62.0	30.6	0.0002*
HCV	26	51.0	25	49.0	0.02	0.8
HIV	1	50.0	1	50.0	Not applicable	

***Statistically significant association (χ2, DF=1)**

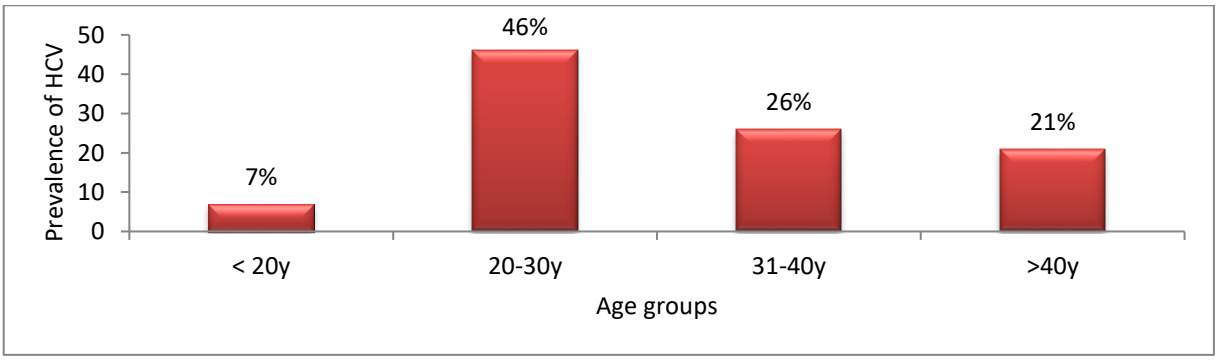

Figure 9: Prevalence of HCV by age group.

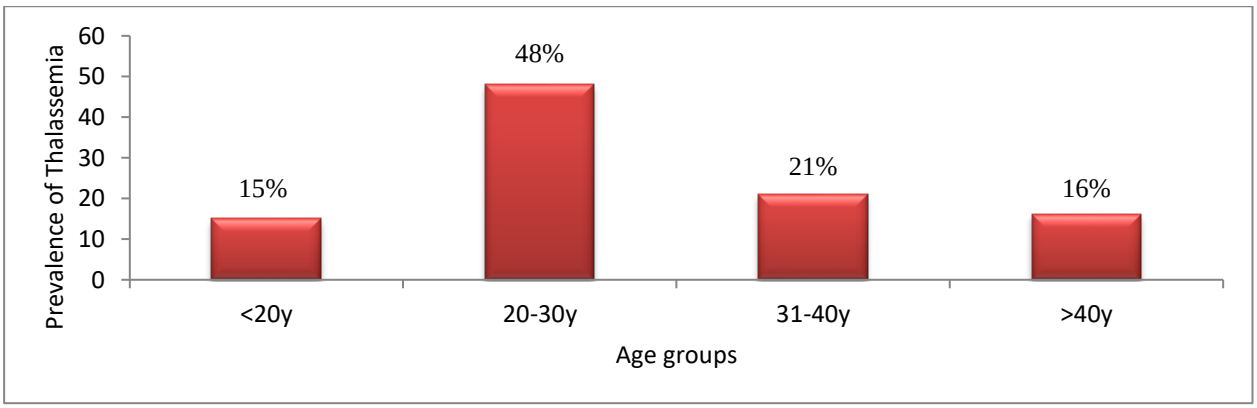

Figure 10: Prevalence of Thalassemia by age group

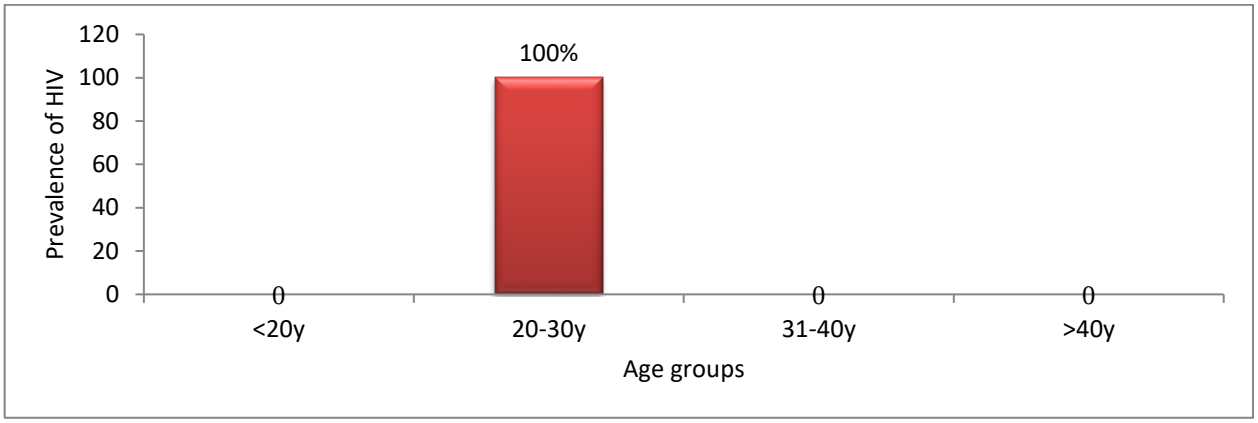

Figure 11: Prevalence of HIV by age group

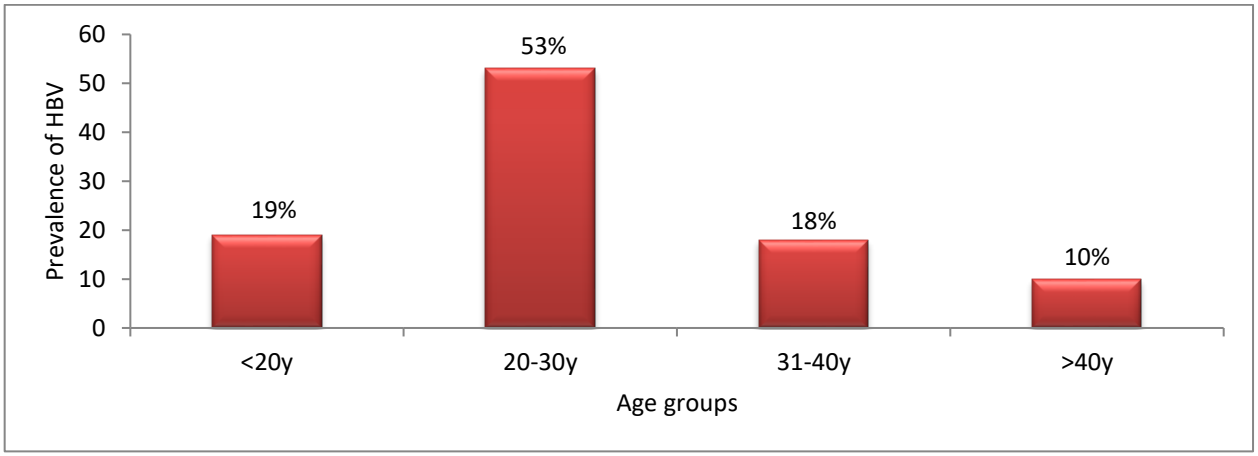

Figure 12: Prevalence of HBV by age group

Table 5: Association between diseases and age group

Disease	Age groups (in years)								χ2	P Value
	< 20Y		20-30		31-40		>40Y			
	No.	%	No.	%	No.	%	No.	%		
Thalassemia	229	15.0	731	48.0	320	21.0	244	16.0	137.3	<0.0001*
HBV	46	19.3	126	52.7	43	18.0	24	10.0	6.8	0.15
HCV	4	8.0	23	46.0	13	26.0	10	20.0	11.4	0.02*
HIV	0	0.0	2	100.0	0	0.0	0	0.0	Not applicable	

Discussion

Discussion PMS program is a health promotion and disease prevention program that aims to preventing vertical or horizontal transmission of diseases through identifying carriers or infected partners. The current study aimed to throw light on the activities of the premarital screening program in Iraq and to estimate the prevalence of thalassemia, HBV, HCV and HIV in five premarital screening centers in Diyala. As the PMS program was conducted in the region as primary prevention yet the most prevalent activity in these centers was blood testing for the diseases involved in the screening. Regarding the prevalence of thalassemia, HBV, HCV and HIV; the current study showed increase in the prevalence of thalassemia, HBV, and HCV from 2015-2018, and that HIV was found only in one couple (during 2017) who were actually married outside court and visited the primary health center for premarital counseling for documenting their marriage officially at court. A similar study was conducted in Saudi Arabia, 2007 showed that prevalence of thalassemia was 3.22% (62), Another study in Saudi Arabia in 2011 showed a decrease in prevalence of thalassemia between premarital people to 1.8 (63). In contrast, in 2012 study done in Sirag/ Saudi Arabia showed that the prevalence of HBV was 4.2 (64). There are about 60 countries

where thalassemia is found, with the highest prevalence in the Mediterranean region, parts of North and West Africa, the Middle East, the Indian subcontinent, the southern Far East, and southeastern Asia, which together make up the so-called thalassemia belt. In western countries, thalassemia primarily affects individuals whose ancestries are traceable to high prevalence areas '66. 26

Globally, approximately 150 million individuals possess beta thalassemia genes. Italy and Greece have higher than average populations of these genes. Sardinia (11 to 34%) (7), Sicily (10%) (a), Greece (5 to 15%), and Iran (4 to 10%) are other areas with high gene frequencies. (20) According to a study conducted in Turkey on 48,126 individuals, the prevalence of sickle cell anemia trait was 0.5% and B-thalassemia trait was 2.1% (7). A different study conducted in Turkey on 19,804 participants discovered that 2.6% of them had the B-thalassemia trait. 3.4% of participants in AL-Hassa, Saudi Arabia's premarital screening program had the B-thalassemia trait (7). According to another study conducted in Saudi Arabia, the prevalence of sickle cell anemia trait was 4.5% and B-thalassemia trait was 1.8% (7).

A study of 488,315 Saudis found that 4.20% had sickle cell trait, 0.26% had sickle cell disease, 3.22% had thalassemia trait, and 0.07% had thalassemia illness (79). In Kocaeli, Turkey, a total of 88,888 persons were checked. Thalassemia trait and sickle cell anemia trait were found in 0.89% and 0.05% of people, respectively. 0.01% of couples were at high risk of having a sibling with homozygous hemoglobinopathy. The prevalence of -thalassemia trait and sickle cell anemia trait was fairly low, reflecting the prevalence in eastern and northern Anatolia and migration to Kocaeli from these geographical regions (76).

This fluctuation in the prevalence of identification of carrier or diseased during premarital counseling either refer to the actual trend of the diseases or reflect the state of community awareness about the program and its benefit. It was found that the dissemination of the knowledge on PMS to the general public through different sources and channels might play a role in this increase in prevalence in thalassemia, HBV, HCV and HIV. 27

On comparing the prevalence of each disease by the premarital screening center's catchment area the current study revealed that prevalence of thalassemia was highest in Khanaquein and this is probably related to the higher percentage of marriage between relatives (consanguinity marriage). Testing for thalassemia from all centers is performed only in Baquba premarital center because one Hb electrophoresis is available in Diyala province, so all cases of thalassemia referred to Baquba for confirm the diagnosis. Regarding age groups most of the affected couples with all diseases included in the screening were aged 20-30 yeas. Although Iraq is considered one of the countries with increasing rate of marriage among teenagers still the highest rate of first documented marriage is among age group 20-30 years and this explained the highest prevalence of cases at this age group. As for gender slight variation in the prevalence of diseases was found between males and females and was statistically significant in cases of thalassemia and HBV. The PMS program is not new in Iraq, it was adopted since 1980 yet it was not obligatory, currently it has been implemented as obligatory prior to completing marriage process at the public official authorities. Regarding consanguinity it was prevalent in 56% of the couples in the current study; the overwhelming majority was because they were cousins or relatives. Genetic counseling which is the process by which individuals or families obtain information about a genetic condition that may affect them is of extreme importance in our community as they can make appropriate decisions about marriage and future reproduction. Premarital screening is essential for changing attitudes towards consanguineous marriage particularly in places where consanguineous and tribal marriages are common, resulting in a high incidence of genetic 28 disorders in contrary of the situation in most western communities. The PMS is usually done in the period between engagement and marriage that might give rise to unexpected result as couples or their families might ignore various reasons due to cultural, social and emotional considerations. Thus, the test needs to be done at early stage so that both couples who decide to marry know the result prior the marriage. This is a real challenge in our community as a considerable number of marriages are currently made by the religious men outside the official courts. This can greatly decrease the value of PMS in having an early decision

whether to go on with the marriage or not based on the screening tests and counseling at the clinics providing PMS services. In the current study almost half of marriages occurred among relatives, including one fifth was a consanguineous marriage (first cousins). In the region, around 25-60% of marriages were among relatives with a high proportion of first cousin marriage (78). The frequency of consanguineous marriage is extremely rare (less than 1%) in North America, Europe, Russia, and Australia, while it is >50% in some Arab countries, Turkey, Iran, Pakistan, and South India (79)

Acknowledgements:

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Conclusion:

1. Noticeable increase in the prevalence of Thalassemia, HBV, HCV, and HIV.
2. Thalassemia and HBV were significantly higher among females' partner
3. Most of the positive cases were among age group 20-30 year
4. Some of those attending for premarital counseling were actually married outside the court and they attend for counseling only when they were documenting their marriage at court.

Recommendations:

1. Iraq is one of the countries with high prevalence of consanguinity marriage so awareness education program is important to encourage couples for the premarital counseling to identify and provide advice to those at risk.
2. Educational program about the common hereditary disease will help people to understand the importance of premarital counseling in identifying the risk of those diseases especially among consanguinity marriage.
3. Improve the activities and services provided by the centers for premarital screening to involve physical examination and education through increasing number of physicians in PMS clinics and proper training.

Source of funding:

Ethical clearance:

Conflict of interest

The author acknowledges no conflict of interest in this study

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