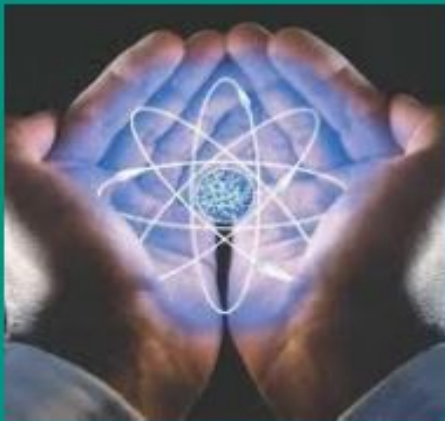


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## Premarital Screening Uncovers Alarming Health Risks in Iraq

### *Pemeriksaan Pranikah Mengungkap Risiko Kesehatan yang Mengkhawatirkan di Irak*

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### Abstract

**Background:** Premarital screening programs, implemented globally since the 1970s, aim to improve reproductive health outcomes by identifying potential genetic and infectious risks before marriage. **Specific Background:** In July 2013, the Thi-Qar Governorate in Iraq introduced a premarital screening program to enhance health outcomes for pregnant women and their offspring. However, regional data on the efficacy and impact of such programs remain limited. **Knowledge Gap:** The prevalence and distribution of blood disorders and infectious diseases among couples in this region, and their implications for public health, have not been extensively documented. **Aims:** This study evaluates the pathophysiological status of couples undergoing premarital screening in Nasiriyah, Iraq, focusing on the prevalence of blood disorders and infectious diseases. **Results:** Data from 14,190 individuals (7095 couples) collected from January to December 2023 revealed significant health concerns: 34.40% had hemoglobin levels below 12 gm/dl, and notable percentages carried thalassemia and sickle cell anemia genes. Gender-specific analysis showed that all males tested positive for HIV, while significant proportions of females tested positive for HCV and T. palladium. No significant differences were found in the ABO blood system. **Novelty:** This study provides comprehensive, region-specific data on premarital screening outcomes in Iraq, highlighting significant disparities in disease prevalence between sexes and compared to other regions. **Implications:** The findings underscore the importance of enhancing premarital screening programs and integrating educational and preventive measures. Future research should include longitudinal studies to assess the long-term impact of these screenings and explore the benefits of incorporating genetic counseling to further mitigate hereditary and infectious risks.

### Highlights:

High prevalence of blood disorders and infections in couples.  
Gender differences: all males positive for HIV, significant female infections.  
Need for improved education and prevention measures.

**Keywords:** Premarital Screening, Hemoglobinopathies, Infectious Diseases, Nasiriyah, Iraq

Published date: 2024-09-03 00:00:00

## Introduction

Marriage is the cornerstone of society and the first step in establishing stable, loving connections with one's spouse and children. Protecting family members against contagious or inherited diseases is the goal of a good marriage. This helped pave the way for a more secure household [1]. To have a healthy family and have healthy children, a marriage must be in a condition of compatibility and harmony between the couples in relation to their physical, mental, social, and legal health [2]. The hemoglobinopathies are among the monogenic diseases that command the most attention from the public. Gene mutations are the root cause of this condition [3]. Additionally, the ABO and Rh blood groups are additionally significant aspects in the field of medicine and transfusion, as well as in the prevention of infant hemolytic illness [4]. These conditions, known as hemoglobinopathies, influence the type and quantity of hemoglobin. The tetramer protein known as hemoglobin is responsible for transporting oxygen throughout the bloodstream. It is composed of two sets of globin chains that collaborate with four heme groups [5].

Among the inherited ailments that are prevalent in Nasiriyah are thalassemia, hemoglobinopathies, and other conditions. These conditions are responsible for high rates of morbidity and mortality, and they place a considerable financial and psychological burden on society. By conducting pre-marital tests, in which the physiological and pathological evaluation of both spouses is carried out before marriage, it is possible to limit the number of children who are born with genetic disorders or other blood-borne diseases. This can be accomplished by either prohibiting or delaying marriage [6]. The term "premarital screening" refers to a series of tests that are administered to couples who are going to be married. These tests analyze the pair for genetic, infectious, and blood-borne problems to lessen the likelihood that they may pass on their sickness to their children. At this point in time, premarital screening is necessary for the prevention of genetic disorders, congenital birth defects, and other medical and psychological issues that may arise during a marriage [7]. Premarital tests are also the most appropriate technique because they are often accepted from a religious and ethnic point of view, in addition to having low requirements in terms of health and finances. Haemoglobinopathies, such as sickle cell anemia and thalassemia, are the focus of most of the testing. These illnesses provide a significant threat to the public's health in the Mediterranean region, which encompasses the Middle East. With inherited haemoglobinopathies such as sickle cell disease and thalassemia, the World Health Organization estimates that there are around 250 million people who are infected with these conditions [8]. There is a high prevalence of consanguineous marriage in the Kingdom of Saudi Arabia, Iraq, and other Islamic countries. This has resulted in an increased frequency of recessive genetic illnesses, including thalassemia and hemoglobinopathies, which are extremely common in the general population of these countries [9].

## Methods

### Data Collection

A statistical study was conducted in the city of Nasiriyah. At the screening clinic for applicants for marriage at Al-Haboubi Teaching Hospital. The data was collected from the clinic with the approval of the Thi-Qar Health Department, where data was collected for 14,190 individuals (7095 couples) for the period from January 2023 to December 2023.

### Statistical Analysis

A statistical analysis was performed on the data obtained from the current study. The analysis was conducted using SPSS version 26, using the independent sample t test and Chi-square for independent variables, with a p-value of less than 0.05

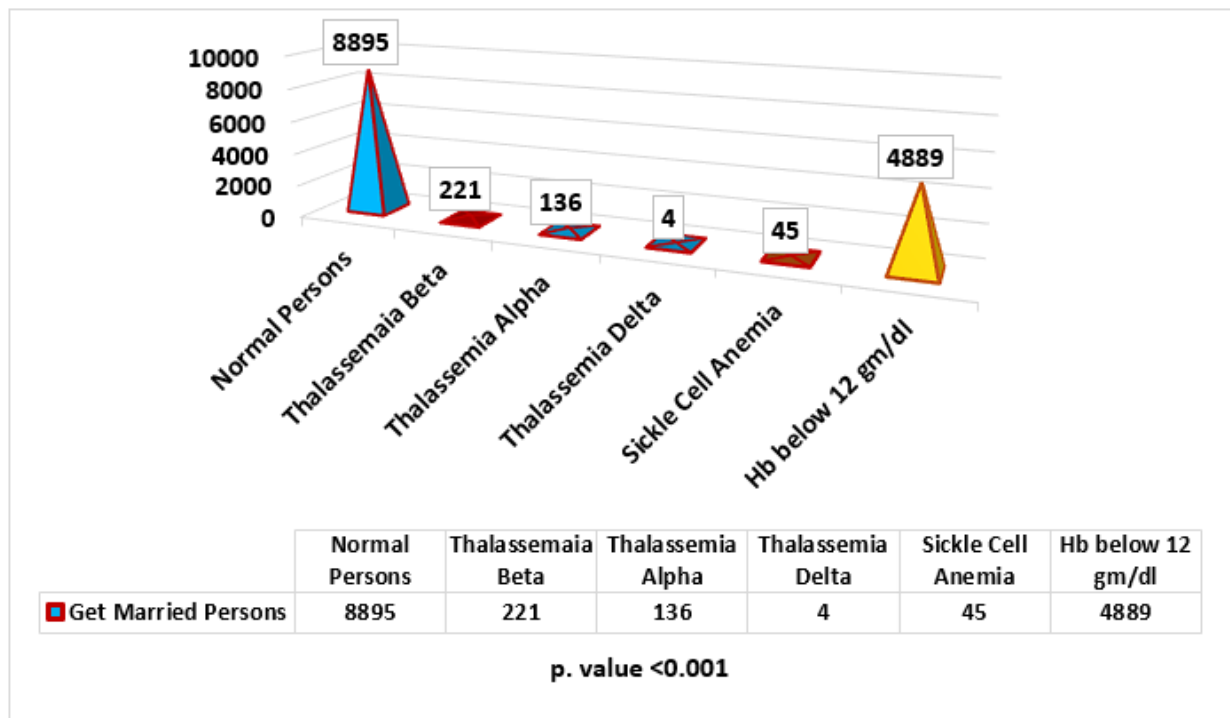
## Result and Discussion

### Result

#### Prevalence Blood Disorders Among Peoples that Applicants for Marriage

According to the prevalence of blood disorders in those individuals, the current study revealed a significant difference at a p-value less than 0.05. The results indicated that 62.68% of the individuals were healthy, 34.45% of the individuals had a hemoglobin level that was below 12 gm/dl, 1.56% of the individuals carried the beta thalassemia gene, 0.96% of the individuals carried the alpha thalassemia gene, 0.03% of the individuals carried the delta thalassemia gene, and 0.32% of the individuals carried the sickle cell anemia gene. As can be seen in figure 1.





**Figure 1.** Prevalence blood disorders among peoples about to get married

#### Prevalence Blood Disorders Syndrome According to the Sex

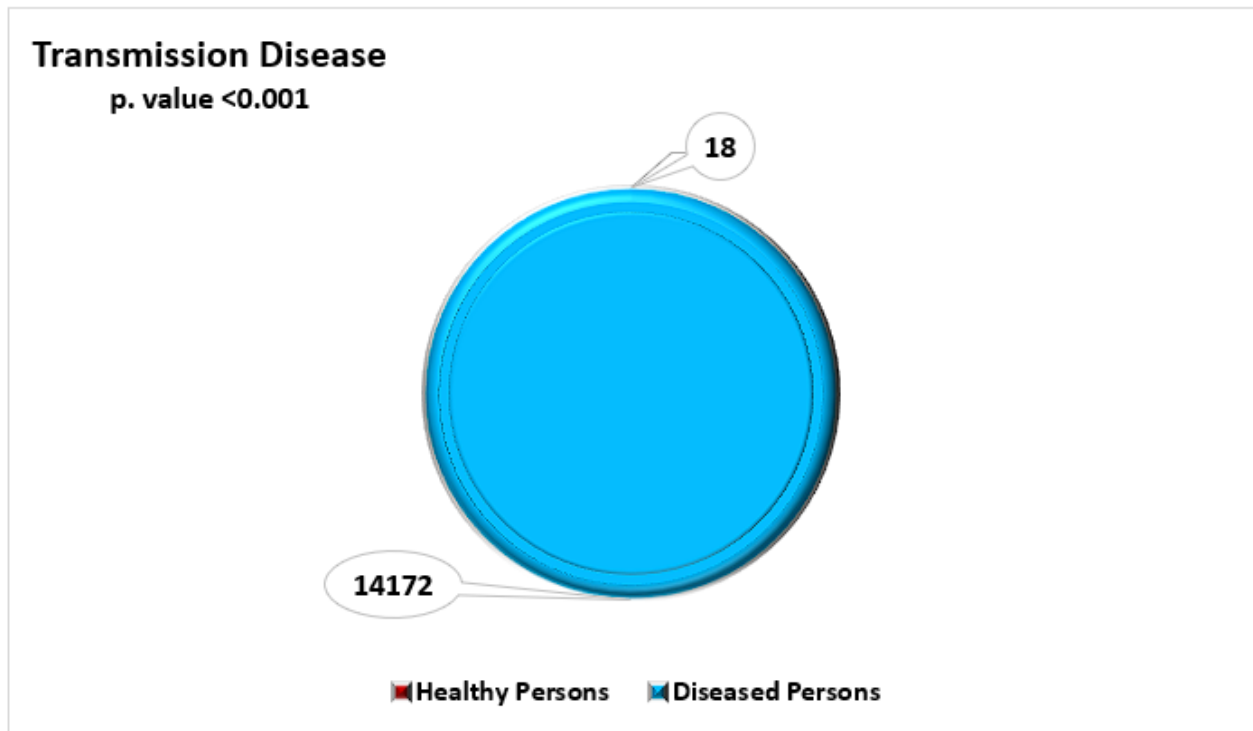
In the present study, a statistically significant difference was observed at a p-value of less than 0.05. This difference was observed in relation to the prevalence of blood disorders between males and females. 54.75% of males carried the beta-thalassemia gene, while 45.25% of females carried the thalassemia gene. Additionally, 61.76% of females carried the alpha-thalassemia gene. Furthermore, 64.12% of females had a hemoglobin level below 12 gm/dl. Furthermore, the delta-thalassemia gene was present in every single male participant. As may be seen in Table1.

Type of Blood Disorders	Male		Female		Total	
	No.	%	No.	%	No.	%
Beta-thalassemia	121	54.75	100	45.25	221	4.21
Alpha-thalassemia	52	38.24	84	61.76	136	2.59
Delta-thalassemia	4	100	0	0.00	4	0.08
Hb below 12 gm/dl	1754	35.88	3135	64.12	4889	93.12
Total	1931	36.78	3319	63.22	5250	100
CalX2= 108.4 TabX2 = 7.49 DF=3 p. value < 0.001						

**Table 1.** Prevalence blood disorders syndrome according to the sex

#### Prevalence of Blood and Sexual Transmission Disease in Peoples Applicants for Marriage

According to the prevalence of infectious disease in those individuals, the current study revealed a significant difference at a p-value less than 0.05. The study revealed that 0.127% of individuals were infected with blood and/or sexual transmission disease, whereas 99.873% of individuals were healthy. As can be seen in Figure 2.



**Figure 2.** Prevalence of blood and sexual transmission disease among peoples applicants for marriage

#### Prevalence of Blood and Sexual Transmission Disease According to Sex

In the present study, a statistically significant difference was observed at a p-value of less than 0.05. This discrepancy was observed in relation to the prevalence of infectious diseases between males and females. Specifically, it was found that 75% of females were infected with HCV, while only 25% of males were infected with HBV. Furthermore, 71.43% of males were infected with HBV, and 100% of males were infected with HIV. Furthermore, 66.67% of females were infected with T. palladium bacteria. As can be seen in Table 2.

Infectious Agents	Male		Female		Total	
	No.	%	No.	%	No.	%
HCV	1	25.00	3	75.0	4	22.22
HBV	5	71.43	2	28.57	7	38.89
HIV	1	100	0	0.00	1	5.56
TP	2	33.33	4	66.67	6	33.33
Total	9	50.0	9	50.0	18	100

CalX2= 148.9 TabX2 = 7.49 DF=3 p. value < 0.001

**Table 2.** Prevalence infectious disease according to the sex

#### Prevalence of ABO System Among Peoples Applicants for Marriage

The current study found that there was a non-significant difference at a p-value less than 0.05. The ABO system was used to analyze the individuals, and the results indicated that 33.92 percent of them carried A+, 44.07 percent carried A-, 38.99 percent carried O+, and 29.2 percent carried O-. The blood group with the lowest percentage was AB-, which was 9.38 percent. As can be seen in Table 2.

ABO System	Positive		Negative		Total	
	No.	%	No.	%	No.	%
A	4622	33.92	249	44.07	4871	34.33
B	2169	15.92	98	17.35	2267	15.98
AB	1522	11.17	53	9.38	1575	11.10
O	5312	38.99	165	29.20	5477	38.60

Total	13625	96.02	565	3.98	14190	100
CalX2= 2.97 TabX2 = 7.49 DF=3 p. value 0.395						

**Table 3.** Prevalence ABO system among people applicants for marriage

#### Evaluation of Hematological Parameters According to the Sex

The current study was recorded a significant difference at p. value < 0.05, in all selected hematological parameters between male and female, was showed was showed those parameters increased significantly in male compared with female. As show in Table.

Hematological Parameters	Male No. 50	Female No. 50	p. value
	Mean ± S. D		
Hb	15.22 ± 1.34	12.71 ± 1.16	< 0.001
MCV	85.97 ± 3.94	83.07 ± 5.72	0.004
MCH	28.64 ± 2.17	27.15 ± 2.30	0.001
MCHC	33.76 ± 1.08	32.69 ± 0.77	< 0.001

**Table 4.** Evaluation of hematological parameters according to the sex

## Discussion

In several countries, including Cyprus, Italy, Greece, and the United Kingdom, premarital screening programs have been developed since the 1970s. These programs have been shown to be successful in reducing the number of births that are impacted by the condition [10]. Because of the effectiveness of these initiatives, several nations in the Middle East, which have a high prevalence of hemoglobinopathies, and which place a significant burden on families and the health system, have adopted programs that are very similar to these. International nations such as Iran, Jordan, Bahrain, Saudi Arabia, and the United Arab Emirates are among those that have launched these projects [11]. July 2013 marked the beginning of work on this initiative in the Thi-Qar Governorate. During the course of the research period, we studied the data of 14,190 couples in order to conduct examinations of individuals who intend to get married in 2023. A seasonal decrease in marriage contracts was seen during the months of Muharram and Safar, which correspond to the months of July and August within the period of the study. In general, this reduction occurred throughout the months of Muharram and Safar. Specifically, this is because the people who live in the governorate have certain social and religious views.

According to the prevalence of blood disorders in those individuals, the current study revealed a significant difference at a p-value less than 0.05. The results indicated that 62.68% of the individuals were healthy, 34.45% of the individuals had a hemoglobin level that was below 12 gm/dl, 1.56% of the individuals carried the beta thalassemia gene, 0.96% of the individuals carried the alpha thalassemia gene, 0.03% of the individuals carried the delta thalassemia gene, and 0.32% of the individuals carried the sickle cell anemia gene. In this study, the prevalence of beta thalassemia was found to be 1.56%, which is lower than the rates that were documented in Karbala Governorate for 3.6%, Baghdad for 4.4%, and Basra for 4.6% [12]. The disparity may be since the studies were conducted over a period of many years, whereas our study was only conducted for a single year. This study found that the prevalence of sickle hemoglobin was 0.32%, which is a relatively low number when compared to the populations of Karbala (0.56%), Dohuk (1.2%), and Basra (6.5%) in Iraq. This study's findings were higher than those of other studies conducted in nations that are geographically close by. The national average for the Kingdom of Saudi Arabia is 5.7% (25,29), Jordan contributes 1%-4.5% (23,28), and Turkey contributes 4.9% [13].

An additional discovery made by our research on infection The presence of diseases in a single patient Additionally, a total of twelve individuals tested positive for the hepatitis B virus, four patients were found to be infected with the hepatitis C virus, and four patients were diagnosed with HIV. One patient was diagnosed with HIV, three patients were infected with the hepatitis C virus, and eleven patients tested positive for the hepatitis B virus, according to a study that was conducted in the Diwaniyah Governorate [14]. This finding agrees with the findings of the current investigation. A limited number of articles were available in Iraq regarding the prevalence of hepatitis B carriers or HCV for the purpose of premarital health screening. In certain other countries, such as Saudi Arabia, the prevalence rate for HBV is 1.95, while the prevalence rate for HCV is 0.45. At a state hospital in Mardin, Turkey, 119 pre-marriage surveys were carried out, and the results revealed that 4.5% of the individuals who were carriers of hepatitis B were reported. The prevalence figure that was determined may appear to be high in comparison to our study because the number of participants in this study is relatively low. There is a possibility that the lower HBV rate in our study is connected to the long-term incorporation of hepatitis B vaccination into vaccination regimens in Iraq, as well as the vaccination of high-risk groups on multiple occasions [14].

The current study found that there was a non-significant difference at a p-value less than 0.05. The ABO system was used to analyze the individuals, and the results indicated that 33.92 percent of them carried A+, 44.07 percent carried A-, 38.99 percent carried O+, and 29.2 percent carried O-. The blood group with the lowest percentage was

AB-, which was 9.38 percent. This aligns with the findings of the research that Fathallah carried out on the people who live in Basra. AB is the blood type that is the least frequent, followed by A and B, and then O, which was the most common blood type [15]. According to the findings of other research, the distribution of ABO blood types among the Saudi Arabian population was the same in order, but with a difference in frequency: O (51%), A (26.5%), B (18%), and AB (18%) (4.5%). In contrast, it showed that the frequency of blood group O was higher, and the frequency of blood group AB was lower [16]. In conclusion, the findings demonstrate the significance of implementing a preventative program for hemoglobinopathies that is based on premarital screening, counseling, and prenatal diagnosis.

## Conclusion

In conclusion, this study underscores the crucial role of premarital screening programs in identifying and mitigating the risks associated with blood disorders and infectious diseases among couples in Nasiriyah, Iraq. The findings reveal a significant prevalence of hemoglobinopathies, including beta-thalassemia and sickle cell anemia, alongside notable differences in the prevalence of infectious diseases between sexes. The data highlight the need for enhanced educational and preventive measures to address these health issues before marriage. While the current screening efforts have identified key health concerns, the observed variations in disease prevalence compared to other regions suggest that ongoing and broader studies are necessary to monitor trends and evaluate the effectiveness of preventive interventions. Future research should focus on longitudinal studies to assess the long-term impact of premarital screening on public health and explore the integration of genetic counseling into such programs to further reduce the incidence of hereditary disorders.

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