Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Seroprevalence of Hepatitis B, Hepatitis C, and Syphilis Antibodies in Premarital Screening Program

Amna M. Meshari[1*], Lamis A. Hameed[2], Hayat Y. Almousawi[3]
[1]Family Medicine Specialist, Basrah Health Directorate, Abi-Alkhasib Sector for Primary Health Care, Basrah, Iraq
[2]Family Medicine, Department of Family and Community Medicine, College of Medicine, University of Basrah, Iraq
[3]Family Medicine Specialist and Clinical Dietician, Al-Mawanni Teaching Hospital, Iraq

Email: deemaabbas76@gmail.com

Abstract. Background: Premarital screening is essential for identifying reproductive, genetic, and infectious diseases to prevent long-term health complications in couples and their future offspring. Specific Background: Infections such as hepatitis B (HBV), hepatitis C (HCV), and syphilis pose serious public health risks, particularly in regions with high endemicity, yet data on their prevalence in premarital populations remain limited. Knowledge Gap: Despite mandatory screening policies, seroprevalence data and associated sociodemographic factors among premarital individuals are underreported. Aim: This study aimed to determine the seroprevalence of HBV, HCV, and syphilis antibodies among individuals undergoing premarital screening and to explore related sociodemographic characteristics. Results: Among 1066 randomly selected participants from Basrah in 2017, the highest prevalence was observed for HBV (0.66/1000), followed by HCV (0.59/1000) and syphilis (0.52/1000). Significant associations were found between all infections and gender and occupation, while HBV was significantly related to residence and syphilis to age. Novelty: This study provides updated, large-scale evidence of low but present infection rates and sociodemographic correlations in a premarital cohort. Implications: Findings support the continuation and refinement of premarital screening programs to guide early interventions, inform public health strategies, and reduce transmission risks to spouses and offspring.

Highlights:

1. Identifies hidden infections in asymptomatic individuals before marriage.
2. Links sociodemographic factors to infection prevalence.
3. Supports targeted public health interventions through early detection.

Keywords: Premarital Screening, Hepatitis B, Hepatitis C, Syphilis, Seroprevalence

Published : 03-07-2025

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Introduction

A thorough examination known as premarital screening is necessary before to marriage and includes assessments of the reproductive organs, genetic conditions, infectious diseases, and blood-borne infections. The purpose of this screening is to shield spouses and their children against long-term health problems. By facilitating the early detection and treatment of risk factors in both the mother and the unborn child, this screening can help avoid stunting, congenital abnormalities, and maternal and infant mortality [1].

Many people regard marriage as a key turning point and stage in their lives. Marriage requires special attention from a health perspective, especially when it comes to the health and medical history of the couple. One preventive strategy that can be used to avert the various health problems that can emerge from marriage is premarital screening [2].

Premarital screening includes evaluating prospective spouses for common genetic conditions such as sickle cell anemia and thalassemia, as well as infectious diseases like syphilis, HIV/ AIDS, hepatitis B, and hepatitis C [3]. It can assist in lowering the risk of birth defects, maternal and infant mortality [4]. Additionally, from a health standpoint, marriage necessitates particular consideration, particularly about the couple's health and medical background. Premarital screening is one preventive method that can be utilized to avoid the several health issues that can arise after marriage [5]. Healthcare providers can also use premarital screening as a method to inform and educate couples, providing them with the information they need to create healthy families and raise healthy children [6].

Historical Review

As a voluntary measure premarital screening test was first begun in Canada, the UK, Cyprus, Greece, and Italy in 1970 with significant success. It became a mandatory requirement in Cyprus in 1973, achieving success rates between 80% and 100% [7]. In some countries, Premarital screening is now a requirement for marriage and a mandated program [8].

In Saudi Arabia, the program is gaining popularity and acceptance among couples to secure a life free from disease and to promote the health of their offspring [9].

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

The program has also been implemented in Indonesia [10]. Premarital screening plays a crucial role in ensuring the health and well-being of couples and their future children. However, in Indonesia, this important practice is still not widely adopted. If all couples were to fully understand and appreciate the benefits of premarital screenings, many long-term health complications that could affect both partners and their future offspring might be prevented [11]. The Premarital Screening (PMS) program in Basrah was initiated in 1994, marking the beginning of a crucial health initiative to ensure couples' well-being before marriage. In the years 2006-2007, the program expanded its scope to include essential testing for blood groups, syphilis, and HIV/AIDS, which are vital for preventing the transmission of these conditions between partners. Subsequently, in response to the growing need for comprehensive health assessments, hepatitis testing was incorporated into the screening process. By 2015, the program further evolved to recognize Hb variant testing as an integral component of premarital screening, enhancing the overall health evaluation for couples preparing to marry [12].

Seroprevalence of Hepatitis B, Hepatitis C, and Syphilis Antibodies in Premarital Screening Program

Premarital screening programs are essential, especially in areas with high rates of certain illnesses, such as hepatitis B, hepatitis C virus, and syphilis. These tests lower the risk of transmission to partners and children by identifying asymptomatic carriers and enabling prompt interventions such as immunization, treatment, and counseling [13]. Viral hepatitis is caused by five different types of hepatitis viruses: A, B, C, D, and E [14]. The viruses that cause hepatitis B and hepatitis C are both major global health concerns. Because these infections are chronic, there may be substantial morbidity and mortality from the emergence of potentially lethal conditions such as liver cirrhosis and hepatocellular cancer [15, 16].

Direct contact with tainted blood, blood transfusions, intravenous injections, unprotected intercourse, and perinatal transmission from the mother to the fetus are the main ways that the Hepatitis B and Hepatitis C viruses are spread [17].

According to estimates from the World Health Organization, there are 50 million people with a hepatitis C virus (HCV) infection and 254 million people with a chronic hepatitis B virus (HBV) infection globally; each day, HBV and HCV cause over 3500 deaths [18].

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

These infections are still common in many parts of the world, including the Middle East, even with the development of safe and efficient hepatitis B vaccines and antiviral therapies for hepatitis B and hepatitis C [19].

Tests for virus-specific serological markers are used to diagnose cases of viral hepatitis. Nonetheless, hepatitis B surface antigen (HBsAg) is among the most effective screening tests. If this antigen remains positive six months after the exposure, it indicates that the patient got a persistent infection. It can be detected one to ten weeks after the exposure. Two to sixteen weeks after HBsAg formation, anti-HBs develops, during blood transfusion or the giving of hepatitis B immune globulin (HBIG), demonstrating the clinical and immunological progress. Hepatitis B core antibody (anti-HBc), which increases and is detectable in serum during acute or chronic phases, signifies an improved state or a distant infection within 2–4 weeks following infection. Hepatitis C is frequently detected by anti-HCV antibodies, and results are sometimes verified by an HCV RNA test [20].

The introduction of the hepatitis B vaccination resulted in a significant 90% decrease in the frequency of new HBV infections [21]. The Centers for Disease Control and Prevention (CDC) recommend that individuals at a high risk of hepatitis C (HCV) should be screened for the virus. Additionally, they advise against sharing toothbrushes or shaving equipment, donating blood or organs, and avoiding sharing or reusing syringes or needles. Currently, no prophylaxis is available, such as an immunoglobulin, a vaccine, or antiviral drugs, for pre- or post-exposure to HCV [22].

Treponema pallidum is the causative agent of syphilis, a disease that seriously compromises public health. According to WHO estimates, 0.69% of women worldwide had maternal syphilis in 2016, which resulted in 661,000 cases of congenital syphilis (CS) and 355,000 related adverse pregnancy outcomes [23].

The disease spreads via abrasion of the skin or mucous membranes during sexual contact, Less common routes of transmission include blood transfusions, organ transplants, nonsexual intimate contact, and uterine infection [24].

Since 2000, the Centers for Disease Control and Prevention (CDC) has documented a steady rise in the incidence of syphilis, mostly among males who have sex with other men; 50,000 new cases are found in the United States each year [25]. The global syphilis prevalence has been estimated at 0.5% (0.4–0.6%) [26].

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

The Venereal Disease Research Laboratory test (VDRL) and Rapid Plasma Reagin (RPR) are nontreponemal (nonspecific) tests that have a sensitivity of 78% and 86%, respectively. They produce positive results 4-6 weeks after infection and 1-3 weeks after the primary lesion appears. The titters are related to disease activity, and there is a chance that the results will be falsely negative at early primary or late syphilis [27]. Tests for treponemal (specific) antibodies are confirmatory tests; the enzyme immunoassay (ELISA) for IgG and IgM is based on a treponemal antigen. Assay for T. pallidum Hemagglutination (TPHA) [20].

Aims of the premarital test

1. To measure seroprevalence of hepatitis B, hepatitis C, and syphilis antibodies in couples undergoing premarital screening programs.
2. To identify sociodemographic characteristics associated with the prevalence of these infections.

Method

A. Study Design

In this record-based descriptive retrospective cross-sectional study, we collected data from participants who visited premarital medical examination centers in Basrah to screen for specific medical conditions required for marriage legalization. The survey was conducted between February 1st and June 30th, 2018.

B. The Place of Data Collection

The data were collected from the premarital medical examination records of eight hospitals in the Basrah Governorate: Basrah teaching hospital, Al-Sader teaching hospital, Al-Mawani teaching hospital, Al-Zubair hospital, Abu-Alkhasib hospital, Al-Medaina hospital, Al-Qurna hospital, and Al-Faw hospital.

C. Study Population

The study involved 45,399 individuals who attended the premarital medical examination centers in 2017.

D. Sample Size and Sampling

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

All participants were included to assess the overall medical conditions. Specific prevalence rates were determined using data from premarital statistics reports. By using the lower prevalence rate (0.5) to calculate the sample size, which will contain all positive cases of any medical conditions, as follows:

$$\text{Sample size (n)} = \frac{Z2*p(1-p)}{E2} = \frac{(1.96)2*0.5(1-0.5)}{(0.03)2} = 1066$$

The sample is divided in each premarital examination center by using this equation:

$$\text{The sample in each center} = \frac{\text{Number of positive cases in each center}}{\text{Total positive cases (in 2017)}} \times \text{sample size}$$

Each one in the study sample was chosen by random sampling

E. Data Collections

These data include:

1. Age: The participants in this study were reported according to their complete year of age.
2. Gender: 1. Male 2. Female
3. Occupation: 1. Housewife. 2. Governmental employee 3. Self-employed 4. Student.
4. Residence: Basrah Centre or Peripheral regions.
5. Result of Laboratory Investigation:
6. HBsAg: 1. Positive in hepatitis B infection. 2. Negative.
7. HCV Ab: 1. Positive in hepatitis C infection. 2. Negative.
8. VDRL: For Syphilis testing done by the ELISA test.

F. Statistical Analysis

IBM SPSS version 26, a statistical program for the social sciences, was used to systematically arrange and analyze the data that had been gathered. The link between the variables was evaluated using the chi-square test, and a P value of less than 0.05 was considered statistically significant.

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Result and Discussion

A. Result

This research included a total of 1066 participant: the most common age of persons examined 501 (47.0%) were (20-29) year, the mean age is (22.8±7.78), also shows that the percentage of females is more than that for males 572 (53.7%) and 494 (46.3%) respectively. More than one-third of them, 476 (44.6%), were housewives, and the lowest percentage, 88 (8.3%), were governmental employees. About one third of 380 (35.6%) of the persons are residents of the Basrah center. Table (1).

Table 1. Socio-demographic characteristics of the sample

Age (years)	**Male**		**Female**		**Total**	**%**
	Number	%	Number	%		
< 20	114	10.7	305	28.6	419	39.3
20-29	288	27.0	213	20	501	47.0
30-39	57	5.3	44	4.1	101	9.4
40-49	23	2.1	9	0.9	32	3
50-59	5	0.5	1	0.1	6	0.6
60-69	4	0.4	0	0	4	0.4
70-79	3	0.3	0	0	3	0.3
Total	**494**	**46.3**	**572**	**53.7**	**1066**	**100**
Occupation	**Male**		**Female**		**Total**	**%**
	Number	%	Number	%		
Housewife	-	-	476	44.6	476	44.6
Self-employed	370	34.7	-	-	370	34.7
Governmental	64	6.0	24	2.3	88	8.3

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Student	60	5.6	72	6.8	132	12.4
Total	**494**	**46.3**	**572**	**53.7**	**1066**	**100**

Residence	Number	%
Basra center	380	35.6
Shatt AL-Arab	89	8.3
Al-Hartha	91	8.5
Al-Faw	5	0.5
Abu-Alkhasib	145	13.6
Al-Zubair	180	16.9
Al-Medaina	72	6.8
Al-Qurna	104	9.8
Total	**1066**	**100.0**

The study shows that Al-Zubair hospital has the highest prevalence rate of at least one positive condition (436.7/1000), and Al-Faw hospital has the lowest prevalence (1.4/1000).

Table 2. Distribution of the total population according to the number examined and positive results in premarital medical examination centers

Premarital medical centers	**Numbers examined**	**number of positive results**	**The prevalence rate of at least one condition**
Basra Teaching Hospital	16013	2628	164.1
Al-Sadder Teaching Hospital	4380	704	160.7
Al-Mawani hospital	5872	372	63.3
Abu-Alkhasib hospital	3918	140	35.7

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Al-Zubair hospital	6620	2891	436.7
Al-Medaina hospital	3058	478	156.3
Al-Qurna hospital	4848	1003	206.8
Al-Fao hospital	690	1	1.4
Total	**45399**	**8217**	**180.9**

In this study the highest positive results were in Al-Zubair hospital in a percentage about (35.1%) and lower percentage in Al-Fao hospital about (0.1%). Table (3)

Table 3. Distribution of sample with positive results on each premarital medical examination Centers

Medical Centers where screening was done	Number	%
Basra teaching hospital	341	32.0
Al-Sadder teaching hospital	92	8.6
Al-Mawanee hospital	48	4.5
Al-Zubair hospital	374	35.1
Abu-Alkhasib hospital	18	1.7
Al-Medaina hospital	62	5.8
Al-Qurna hospital	130	12.2
Al-Faw hospital	1	0.1
Total	**1066**	**100**

The highest prevalence rate was for positive hepatitis B virus (0.66/1000) and the lowest rate was for positive VDRL (0.52/1000). Table (4)

Table 4. Prevalence rate of various positive conditions detected by premarital examination.

Condition	Number examined	Number positive	Prevalence rate/1000

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

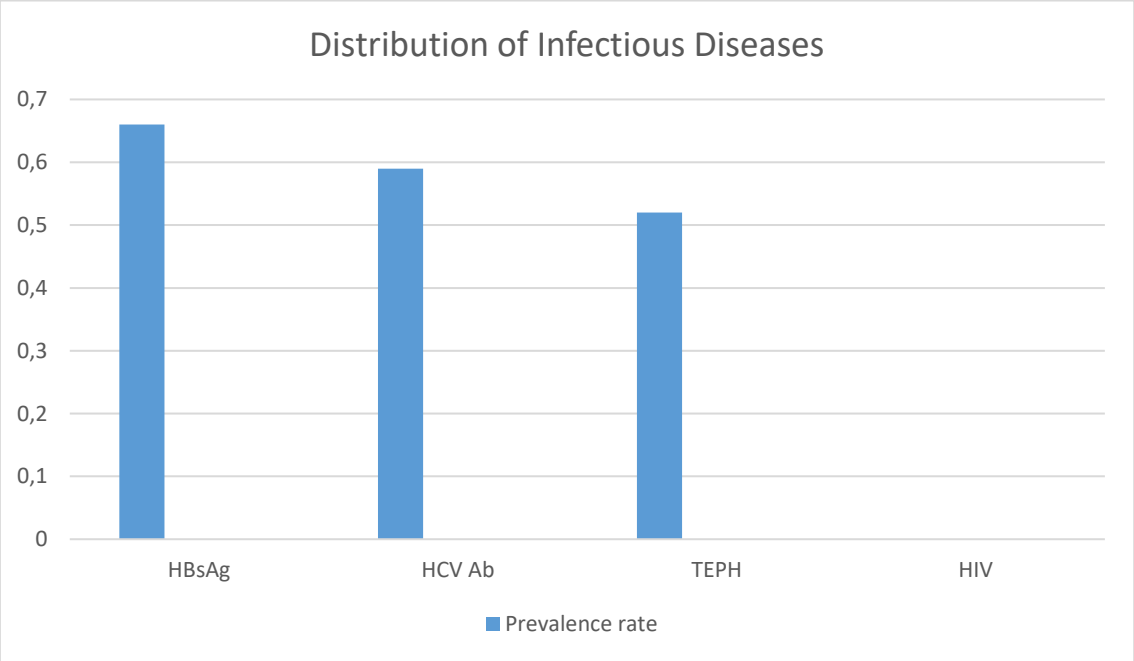
https://doi.org/10.21070/ijhsm.v2i1.184

TPHA	45399	24	0.52
Hepatitis B virus	45399	30	0.66
Hepatitis C virus	45388	27	0.59

The Serological tests for infectious diseases in premarital medical examination centers show positive results with a prevalence of (0.66/1000), (0.59/1000), and (0.52/1000) for HBsAg, HCV Ab, and VDRL, respectively. As shown in Table (5) and figure 1.

Table 5. Distribution of the sample according to the results of serological tests for infectious diseases

Serological tests	Number examined	Positive result	Prevalence rate/ 1000
HBsAg	45399	30	0.66
HCV Ab	45388	27	0.59
TPHA	45399	24	0.52
HIV	45399	0	0



Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Fig 1. Prevalence rate of Infectious diseases according to the results of serological tests among premarital couples

The study shows a significant relationship between all infectious diseases with gender and occupation, while HBV infection shows a significant relationship with residence, and VDRL with age.

Table 6. Distribution of the sample with infectious diseases by socio-demographic characteristics

	HBsAg			**HCV**			**TPHA**		
Age (Years)	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**	**Positive**	**Negative**	**Total**
< 20	4	415	419	5	414	419	7	412	419
20-29	21	480	501	18	483	501	11	490	501
30-39	3	98	101	1	100	101	3	98	101
40-49	1	31	32	2	30	32	2	30	32
50-59	1	5	6	1	5	6	1	5	6
60-69	0	4	4	0	4	4	0	4	4
70-79	0	3	3	0	3	3	0	3	3
Total	**30**	**1036**	**1066**	**27**	**1039**	**1066**	**24**	**1042**	**1066**
P value	**P= 0.092/ not significant** X^2=10.207[a]			**P= 0.131/ not significant** X^2=9.858[a]			**P= 0.020/ significant** X^2=15.022[a]		
Gender									
Male	21	473	494	22	472	494	17	477	494
Female	9	563	572	5	567	572	7	565	572

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Total	**30**	**1036**	**1066**	**27**	**1039**	**1066**	**24**	**1042**	**1066**
P value	**P= 0.008/ significant** X^2=6.948[a]			**P= 0.000/Highly significant** X^2=13.756[a]			**P= 0.015 / significant** X^2=5.923[a]		
Occupation									
House wife	9	467	476	5	471	476	6	470	476
Governmental	1	87	88	1	86	88	0	88	88
Self-employed	20	350	370	19	351	370	17	353	370
Student	0	132	132	2	130	132	1	131	132
Total	**30**	**1036**	**1066**	**27**	**1039**	**1066**	**24**	**1042**	**1066**
P value	**P= 0.002/Highly significant** X^2=15.295[a]			**P= 0.000/Highly significant** X^2=22.708[a]			**P= 0.022/ significant** X^2=9.614[a]		
Residence	**HBsAg**		**Total**	**HCV**		**Total**	**TPHA**		**Total**
	positive	**Negative**		**Positive**	**negative**		**positive**	**Negative**	
Basra center	10	370	380	12	368	380	10	370	380

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

Shatt Al-Arab	3	86	89	4	85	89	2	87	89
Al-Hartha	3	88	91	2	89	91	3	88	91
Al-Faw	2	3	5	0	5	5	0	5	5
Abu Alkhasib	4	141	145	1	144	145	3	142	145
Al-Zubair	3	177	180	4	176	180	5	175	180
Al-Mdaina	3	69	72	1	71	72	1	71	72
Al-Qurna	2	102	104	3	101	104	0	104	104
Total	**30**	**1036**	**1066**	**27**	**1039**	**1066**	**24**	**1042**	**1066**
P value	**P = 0.000/Highly significant** $X^2=30.349^a$			**P = 0.638/ not significant** $X^2=5.182^a$			**P = 0.218/ not significant** $X^2=9.510^a$		

B. Discussion

1. Socio-Demographic Characteristics

This research included 1066 participants, and the majority, 501(47.0%), were between the ages of 20- 29. The mean age of the study sample was 22.8±7.78 years, which reveals the social attitude towards encouraging early marriage. In contrast, in a study done in Iraqi Kurdistan, the mean age was 26.87±6.57 years, and roughly three-fifths of the participants were between the ages of 23 and 31 [13]. Females are more

Indonesian Journal on Health Science and Medicine
Vol 2 No 1 (2025): July
ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

than that for males, 572 (53.7%) and 494 (46.3%) respectively. This agrees with the results of studies done by Tiryag [28] and Angileri [29].

2. HBsAg for Hepatitis B Infection

Iraq is considered to have an intermediate endemicity for HBV infection. In this study, about 6.6% are positive for HBsAg; this result is much higher than that reported by studies in Syria (0.68%) [30] and Iran (1.1%) [31].

There is a significant association between HBsAg and gender in this study (P=0.008), with males having higher levels of HBsAg than females. This could be because men are more likely than women to engage in risky behaviors, including having several sexual partners and abusing IV medications. This finding is consistent with research conducted in Saudi Arabia [32].

Also, a highly significant association exists between HBsAg and occupation (P=0.000), particularly among self-employed people. This could be because self-employed people are more vulnerable to risk transmission. After all, they are often less aware of how the infection spreads and how to prevent it; this result agrees with a study in Iran [31].

This study shows a significant relationship between HBsAg and residence (P=0.000), and the majority of cases of positive HBsAg were young (20-29 years). However, the relationship between HBsAg and age was statistically not significant (P = 0.092). A study done in Iraqi Kurdistan shows that male gender and living in urban areas were identified as significant risk factors for contracting HBV [13].

3. HCV Ab for Hepatitis C Infection

In our study, the prevalence of HCV infection was 5.9%. The results are significantly greater than those reported in Saudi Arabia [14], Turkey [33], and Calabar, Nigeria [34].

The relationship between HCV Ab and gender is statistically highly significant (P= 0.000), and the majority of positive patients were males, which is consistent with research in Saudi Arabia [32]. Also, the relation is highly significant with occupation (P=0.000); most positive cases are self-employed. Most cases were young (20-29 years), but the relation with age is statistically not significant (P = 0.131).

4. TPHA for Syphilis

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

The present study showed that the rate of syphilis was 5.2%, which is higher than that reported in Iran [35], Argentina [29], and lower than that for China (18.6%) [36]. There is a highly significant relationship between syphilis and gender (P = 0.015); males are more affected, and there is a significant relationship with age (P = 0.020). Most cases occurred among young individuals (20-29 years old), which could be attributable to these young men engaging more in riskier behaviors. Additionally, there is a significant relationship with occupation (P = 0.022), which could be related to the fact that males working in specific jobs are more likely to have no or poor education, making them more inclined to engage in dangerous conduct.

Conclusions

1. The study shows a high seroprevalence rate of hepatitis B and hepatitis C infection, which is significantly related to gender and occupation.
2. The results show that the prevalence of Syphilis is high and it is significantly related to age, gender, and occupation.

References

[1] N. H. T. Sidabutar and E. N. Hadi, "Premarital Screening: A Catalyst for Achieving Good Health and Well-Being," Jurnal Promkes: The Indonesian Journal of Health Promotion and Health Education, vol. 12, 2024.

[2] H. Suresh, S. Jamil, B. K. Padhi, and M. J. Hossain, "Thalassemia Prevention: Religious and Cultural Barriers to Premarital Screening in Bangladesh," Health Science Reports, vol. 6, p. e1176, 2023.

[3] A. Alhosain, "Premarital Screening Programs in the Middle East, From a Human Right's Perspective," Diversity Equality Health Care, vol. 15, pp. 41–45, 2018.

[4] A. A. Al-Balushi and B. Al-Hinai, "Should Premarital Screening for Blood Disorders Be an Obligatory Measure in Oman?," Sultan Qaboos University Medical Journal, vol. 18, p. e24, 2018.

[5] J. Natarajan and M. A. Joseph, "Premarital Screening for Genetic Blood Disorders—An Integrated Review on the Knowledge and Attitudes of Middle Eastern University Students," Middle East Fertility Society Journal, vol. 26, p. 19, 2021.

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

[6] S. AlOtaiby, A. Alqahtani, R. Saleh, A. Mazyad, A. Albohigan, and E. Kutbi, "Comprehension of Premarital Screening and Genetic Disorders Among the Population of Riyadh," Journal of Taibah University Medical Sciences, vol. 18, p. 822, 2023.

[7] F. M. Alswaidi and S. J. O'Brien, "Premarital Screening Programmes for Haemoglobinopathies, HIV and Hepatitis Viruses: Review and Factors Affecting Their Success," Journal of Medical Screening, vol. 16, pp. 22–28, 2009.

[8] W. A. Al-Shroby, S. M. Sulimani, S. A. Alhurishi, M. E. Bin Dayel, N. A. Alsanie, and N. J. Alhraiwil, "Awareness of Premarital Screening and Genetic Counseling Among Saudis and Its Association With Sociodemographic Factors: A National Study," Journal of Multidisciplinary Healthcare, pp. 389–399, 2021.

[9] N. Alhusseini, H. Farhan, L. Yaseen, S. Abid, S. S. Imad, and M. Ramadan, "Premarital Mental Health Screening Among the Saudi Population," Journal of Taibah University Medical Sciences, vol. 18, pp. 154–161, 2023.

[10] L. F. Y. Alvarado and M. R. A. Pranoto, "Premarital Screening: A Catalyst for Achieving Good Health and Well-Being," Unpublished Manuscript, 2024.

[11] M. Saffi and N. Howard, "Exploring the Effectiveness of Mandatory Premarital Screening and Genetic Counselling Programmes for β-Thalassaemia in the Middle East: A Scoping Review," Public Health Genomics, vol. 18, pp. 193–203, 2015.

[12] E. H. Rahi, Z. M. H. Al-Hejaj, and A. M. Tiryag, "Nurses' Knowledge of Nonalcoholic Fatty Liver Disease: A Cross-Sectional Study," Academia Open, vol. 9, pp. 10306–10306, 2024.

[13] I. A. Naqid et al., "Hepatitis B and C Virus Infection Among Couples Undergoing Premarital Screening in Iraqi Kurdistan," IJID Regions, vol. 14, p. 100492, 2025.

[14] S. A. Mir and B. Alshehri, "Seroprevalence of Hepatitis B and C Viral Infections in the Premarital Adult Population of Al Majmaah, Saudi Arabia," Malawi Medical Journal, vol. 33, pp. 221–225, 2021.

[15] S. A. Jamal et al., "The Prevalence of Hepatitis B and C Virus in Healthy Women in Zakho City, Kurdistan Region of Iraq: A Brief Report," J Kermanshah Univ Med Sci, vol. 23, p. e99337, 2019.

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

[16] N. R. Hussein et al., "Prevalence of HBV, HCV and HIV Infections Among Syrian Refugees in Kurdistan Region, Iraq," International Journal of Infectious Diseases, vol. 4, p. e39420, 2017.

[17] C. Trépo, H. L. Chan, and A. Lok, "Hepatitis B Virus Infection," The Lancet, vol. 384, pp. 2053–2063, 2014.

[18] D. Hu, M. Kane, and D. L. Heymann, "Transmission of HIV, Hepatitis B Virus, and Other Bloodborne Pathogens in Health Care Settings: A Review of Risk Factors and Guidelines for Prevention," Bulletin of the World Health Organization, vol. 69, p. 623, 1991.

[19] H. M. Sabty, S. B. Dawood, and A. M. Tiryag, "Nurses' Knowledge and Practices on Influenza Vaccination for Pregnant Women," Jurnal Kebidanan Midwiferia, vol. 10, pp. 50–59, 2024.

[20] R. A. d. A. Pondé, "The Serological Markers of Acute Infection With Hepatitis A, B, C, D, E and G Viruses Revisited," Archives of Virology, vol. 162, pp. 3587–3602, 2017.

[21] F. A. Jassim, A. M. Tiryag, and S. S. Issa, "Effect of Bad Habits on the Growth of School Students: A Cross-Sectional Study," Indonesian Journal on Health Science and Medicine, vol. 1, pp. 10–21070, 2024.

[22] H. H. Abdul-Ra'aoof et al., "Moderate Knowledge and Attitudes Toward Tonsillitis Among Nursing Students," Academia Open, vol. 10, pp. 11323–11323, 2025.

[23] W. Xiong et al., "Preconception Syphilis Seroprevalence and Association With Duration of Marriage and Age Among Married Individuals in Guangdong Province, China: A Population-Based Cross-Sectional Study," PLOS Neglected Tropical Diseases, vol. 16, p. e0010884, 2022.

[24] S. S. Hamid et al., "A Study Regarding the Basic Anatomy and Physiology of the Eye Among Nursing Students: A Cross-Sectional Study," Indonesian Journal on Health Science and Medicine, vol. 2, pp. 127–127, 2025.

[25] A. M. Tiryag, "Nurses' Knowledge and Attitudes Toward Pacemaker: A Cross-Sectional Study," Academia Open, vol. 9, pp. 8845–8845, 2024.

[26] L. Newman et al., "Global Estimates of the Prevalence and Incidence of Four Curable Sexually Transmitted Infections in 2012 Based on Systematic Review and Global Reporting," PLOS ONE, vol. 10, p. e0143304, 2015.

ISSN 3063-8186. Published by Universitas Muhammadiyah Sidoarjo

https://doi.org/10.21070/ijhsm.v2i1.184

[27] A. M. Tiryag and H. H. Atiyah, "Nurses' Knowledge Toward Bariatric Surgery at Surgical Wards at Teaching Hospitals in Al-Basra City," Indian Journal of Forensic Medicine & Toxicology, vol. 15, pp. 5152–5159, 2021.

[28] A. Tiryag, "Revitalizing Hearts: The Transformative Impact of Pacemaker Therapy on Cardiac Conduction Disorders," Academia Open, vol. 9, pp. 10–21070, 2024.

[29] P. Angeleri et al., "Viral Hepatitis and Treponema Pallidum Prevalence in Persons Who Underwent Premarital Blood Tests in Argentina," Scientific Reports, vol. 9, p. 9611, 2019.

[30] H. Bashour and G. Muhjazi, "Hepatitis B and C in the Syrian Arab Republic," Eastern Mediterranean Health Journal, p. 267, 2016.

[31] M. M. Hayatbakhsh et al., "Seroprevalence of Hepatitis B Before Marriage: A Study on Marriage Candidates in the Southeast of Iran; Is It Worthy of Consideration?," Archives of Iranian Medicine, vol. 18, pp. 0–0, 2015.

[32] S. M. Abdullah, "Prevalence of Hepatitis B and C Virus Infection and Their Co-relation With Hematological and Hepatic Parameters in Subjects Undergoing Premarital Screening in the Jazan Region, Kingdom of Saudi Arabia," Pakistan Journal of Medical Sciences, vol. 34, p. 316, 2018.

[33] H. C. Bilek, A. Deveci, and E. A. Tanyel, "Seroprevalence of Hepatitis A Virus, Hepatitis B Virus, Hepatitis C Virus, and Syphilis Among Human Immunodeficiency Virus-Infected People at a University Hospital, Turkey," Archives of Medical Science, 2020.

[34] D. S. Alfadhli et al., "Hepatitis B Virus, Hepatitis C Virus, and Human Immunodeficiency Virus Infection Among Premarital Screening Individuals in Saudi Arabia," International Journal of Public Health, vol. 69, p. 1607809, 2024.

[35] F. Esmaeilzadeh et al., "Prevalence of Syphilis Infections Among the Iranian Population: A Systematic Review and Meta-Analysis," Iranian Journal of Public Health, vol. 51, p. 1513, 2022.

[36] X.-E. Gui et al., "A Comprehensive Prevention Program on AIDS, HBV and Syphilis Among Pregnant Women and Couples Experienced Premarital Medical Examination," Zhonghua Liu Xing Bing Xue Za Zhi (Chinese Journal of Epidemiology), vol. 31, pp. 873–875, 2010.