

Proportion of Infection by Hepatitis B, C, and Human Immunodeficiency Viruses Among Libyans and Foreign Workers in Tarhouna City

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الخلاصة:

تعتبر فيروسات التهاب الكبد البائي و الجيمي ونقص المناعة البشري من الفيروسات الخطيرة التي تسبب مشاكل صحية مزمنة في جميع أنحاء العالم، ويعد التطعيم والأدوية المضادة للفيروسات والعلاج المضاد للفيروسات الرجعية من الاستراتيجيات الحاسمة للوقاية من هذه العدوى وعلاجها. أجريت الدراسة في الفترة من مارس إلى مايو 2023 وهدفت الى تقييم حدوث الإصابة بالتهاب الكبد البائي وفيروس التهاب الكبد الجيمي وفيروس نقص المناعة البشري لدى الأفراد الذكور والإناث من مختلف الجنسيات، باستخدام إحصائيات من أرشيف العيادة الصحية- ترهونة. شملت الدراسة 106 حالة ، منها 99 (93.4) ذكراً و 7 (6.6) إناث. وأظهرت النتائج أن الإصابة بالتهاب الكبد البائي و الجيمي وفيروس نقص المناعة البشري كانت منتشرة على نطاق واسع بين الأفراد المشاركين في الدراسة. ووضحت الدراسة وجود فروق ذات دلالة إحصائية عالية بين أنواع الإصابة بالتهاب الكبد البائي حسب الجنسية؛ واما للجنس والعمر والمهنة ، لا توجد فروق ذات دلالة إحصائية بين أنواع فيروسات عدوى التهاب الكبد. وتبين أن معظم الإصابات بفيروس التهاب الكبد البائي الجيمي كانت لمرضى الجنسية المصرية، في حين أن الجنسيات الأخرى لديها ارتفاع في الإصابة بفيروس التهاب الكبد البائي (ب). توصي الدراسة بفحص جميع المرضى بحثاً عن الإصابة بفيروس HBsAg و HCV وفيروس نقص المناعة البشري HIV قبل الإقامة والتوظيف والممارسة المهنية، والخضوع لفحوصات بجهاز قياس الاجسام المضادة المناعية بطريقة الإنزيمات المرتبطة دورية كل ستة أشهر .

الكلمات الدالة: فيروس التهاب الكبد B، وفيروس التهاب الكبد C، وفيروس المناعة البشري، والعدوى



Abstract:

Hepatitis B, C, and HIV are dangerous viruses that cause chronic health problems worldwide. Vaccination, antiviral medications, and antiretroviral therapy are crucial strategies to prevent and treat these infections. A study conducted from March to May 2023 evaluated the occurrence of HBsAg, HCV, and HIV in both male and female individuals across various nationalities, using statistics from the Health Clinic-Tarhouna archive.

The study involved 106 reported cases that were investigated, with 99 (93.4%) males and 7 (6.6%) females. The results showed that the infection with hepatitis B and C and HIV was widespread among the individuals participating in the study. There were highly statistically significant differences between the types of hepatitis infection according to nationality; it was found that most of the infections by the hepatitis C virus were for patients of Egyptian nationality. As for gender, age, and profession, there are no significant differences between the types of hepatitis infection viruses. While other nationalities had a high incidence of the hepatitis B virus.

The study recommends that all patients be screened for HBsAg, HCV, and HIV infection before residency, employment, and professional practice and undergo periodic ELISA examinations every six months.

Keywords: hepatitis B, hepatitis C, human immune virus, and infection.

Introduction:

Infectious diseases like HIV, tuberculosis, and viral hepatitis pose significant global public health concerns. Hepatitis, caused by various virus types, is a liver inflammation. Common forms include Hepatitis B and Hepatitis C. Transmission of these infections is similar, with common factors including exposure to infected blood, injection drug use, and reuse of syringes. However, HBV infection can also be caused by sexual contact and mother-to-child transmission at the prenatal stage. In 2015, over a million people died from viral hepatitis, more than the combined deaths from HIV and TB. Despite increasing mortality rates due to viral hepatitis, HIV- and TB-associated mortality rates are decreasing globally. In 2015, 720,000 people died from chronic liver disease and 470,000 from hepatocellular carcinoma due to viral hepatitis..(Samo, A. A., *et al.*, 2021)

HBV, a Hepadnaviridae virus, is more common in the African and Western Pacific regions, but also affects countries in Asia. HCV, a Flaviviridae virus, is common globally. HBV can be transmitted horizontally through direct contact with infected blood products or vertically from infected mothers to their neonates during pregnancy or delivery. Neonates born to chronically infected mothers have a 70%-90% risk of the

infection progressing to a chronic phase. HBV is the world's most common etiologic agent of life-threatening liver disease, a major public health problem, especially in developing countries. (Bafa, T. A., & Egata, A. D. 2020)

HCV, a hepatitis B virus, is a major global public health concern, with around 3% of the population infected annually. The majority of cases occur in Africa, particularly Ethiopia. Almost 50% of cases become chronic carriers, at risk of liver cirrhosis and cancer. The Human Immunodeficiency Virus (HIV) impairs immune cell functions, making individuals more susceptible to infections, disease, malignancy, and end-organ damage. HIV-infected individuals are three to six times more likely to develop chronic or long-term hepatitis B infections due to suppressed immune systems. Studies show that HIV accelerates the progression to chronic liver disease due to drug-related hepatotoxicity and hepatitis reactivation, increasing the chances of liver-related diseases compared to individuals with HIV infection alone. Despite biological differences, the three viruses share similar modes of transmission and common risk factors, coexisting in the same host at a high rate. (Lawal, M. A., *et al.*, 2020)

Rationale: HBV, HCV, and HIV infections are the most contagious viruses that are spread through blood, contaminated sharp objects, or unsafe sexual contact. People who have had direct or indirect contact with infected patients or their materials are more vulnerable to infection.

Aim of the study: The study aimed to determine the predominance of hepatitis B, C viruses, and HIV among citizens and foreigners in the City of Tarhouna.

Objectives: Our study shows incidence rates of hepatitis B, C viruses, and HIV among citizens and immigrants in the City of Tarhouna.

General objective: To estimate the occurrence of infection by hepatitis B, C viruses, and HIV among natives and foreign persons in the City of Tarhouna.

Specific objectives: To detection of infection caused by viruses B, C, and human immunodeficiency virus and to find out the relationship of expatriates in terms of increasing the proportion of B, C, and HIV viruses with risk factors (age, gender, nationality, type of infection).

Materials and Methods: This study depended on estimating the proportion and frequency of hepatitis B, C, and HIV infections that happen among patients' citizens and foreign individuals to detect hepatitis B, C, and HIV and to find out the relationship between the infection and study variables (age, gender, occupation, and nationality). This study was based on the prevalence of infection with the hepatitis B and C viruses and HIV in citizens and foreign individuals.

Type of study: a retrospective study.

Area of study: Tarhouna, Libya (Health Clinic).

Duration of study: This study was started from March 16 to May 28, 2023.

Study variables:

Dependent variables: hepatitis B and C and HIV viruses.

Independent variables: gender, age, and nationality.

Study Criteria:

Inclusion Criteria: All patients' citizens and foreign.

Exclusion Criteria: None.

Target population and sample size: 106 patients' citizens and foreigners.

Data collection: The data for this study were collected from the archives of the health clinic in Tarhouna until 2022. The data included age, gender, type of infection, and nationality.

Study population: The study population consisted of men (99) and women (7) aged between 18 and 56 years.

Statistical Analysis: The data entered into the computer after coding is required to perform the statistical analysis using statistical packages for social sciences (SPSS) used to answer the questions of the study at a significant level ($P\text{-value} \leq 0.05$).

Results: The data has been entered into the computer after coding. To perform the statistical operations required to analyze the data using the statistical program, the statistical packages for social sciences (SPSS) were used to answer the study questions at a significant level (≤ 0.05), which is an acceptable level in the social and human fields. With science in general, sometimes we need to calculate some reliable indicators of the phenomenon in terms of the value at which the values are averaged or deducted, in terms of the degree of homogeneity of the values that the variable takes, so we need to provide some statistical measures through which we can determine the differences between study variables. The following have been used: frequency distributions to determine the number of frequencies, the percentage of repetition of all study variables, and the Chi² test to determine differences between response ratios in non-ordinal measures.

Director's Demographic Characteristics:

1. Distribution of sample individuals according to gender:

Table (1) repetitive distributions and percentages of the sample individuals according to gender:

Gender	No.	Percentage%
Male	99	93.4
Female	7	6.6
Total	106	100

The data set out in the above table regarding the distribution of the sample individuals on the basis of gender indicate that the percentage of males represents (93.4%), while the females' percentage represents (6.6%) of the individuals participating in the study.

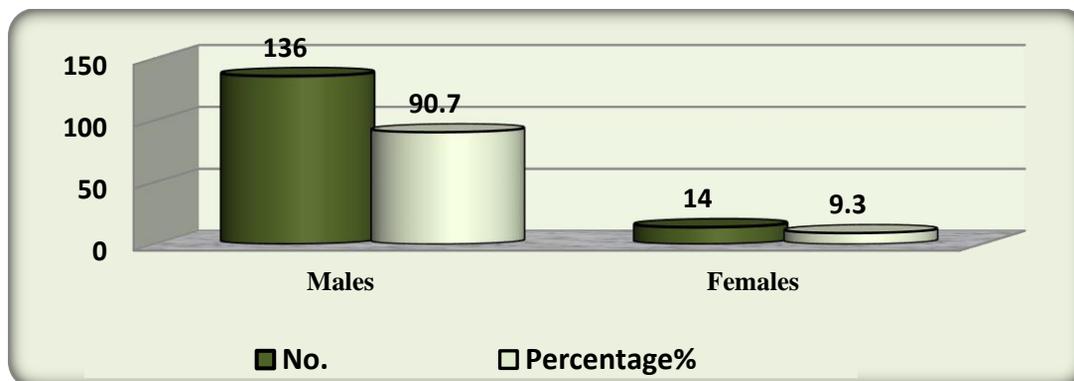


Figure (1) Repetitive Distribution and percentage of the sample individuals according to gender.

2- Distribution of sample individuals on an age basis

Table (2): The repetitive distributions and percentage of the sample individuals according to age:

Age category	No.	Percentage%
Less than 25 years	4	3.8
25 less than 35 years	39	36.8
36 less than 40 years	46	43.4
41 less than 45 years	14	13.2
46 years and more	3	2.8
Total	106	100

The data set out in the above table regarding the distribution of the sample individuals on the basis of age categories indicate that most of the sample individuals ages vary from 36 to 40 years with a percentage of 43.4 percent, followed by the age category from 25 to 35 years with a percentage of 36.8%, followed by the age category from 41 to 45 years with a percentage of 13.2%, followed by the age category less than 25 years with a percentage of 3.8%, followed by the age category from 46 years and more with a percentage of 2.8%.

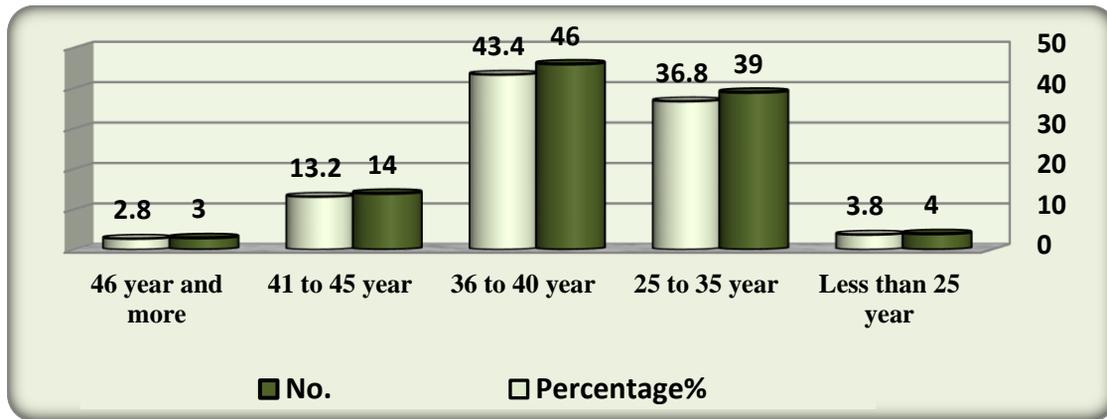


Figure (2) repetitive distribution and percentage of sample individuals according to age.

3: Distribution of sample individuals according to occupation

Table (3): The repetitive distributions and percentage of the sample individuals according to occupation:

Occupation	No.	Percentage%
Labor	54	50.9
Free work	17	16
Employee	33	31.1
Non-work	2	1.9
Total	106	100

The data set out in the above table relating to the distribution of the sample individuals on the basis of occupation designated that the highest percentage was for labor, with a percentage of 50.9%, followed by employees with a percentage of 30.1%, then free work at 16.1%, and finally those without work at a 1.9% percentage.



Figure (3) Repetitive distribution and percentage of sample individuals according to occupation.

4: Distribution of the sample individuals according to nationality

Table (4) repetitive distribution and percentage of the sample individuals according to nationality:

Nationality	No.	Percentage%
Libyan	48	45.3
Egyptian	10	9.4
Nigerian	22	20.8
Chadian	11	10.4
Ghanaian	9	8.5
Sudanese	6	5.7
Total	106	100

From table 4, it was discovered that 45.3% of the patients were Libyans, and the percentage of Egyptians was 9.4%. It was also found that 20.8% of the patients were from Nigeria, 10.4% were Chadians, 8.5% were Ghanaians, and 5.7% were Sudanese.

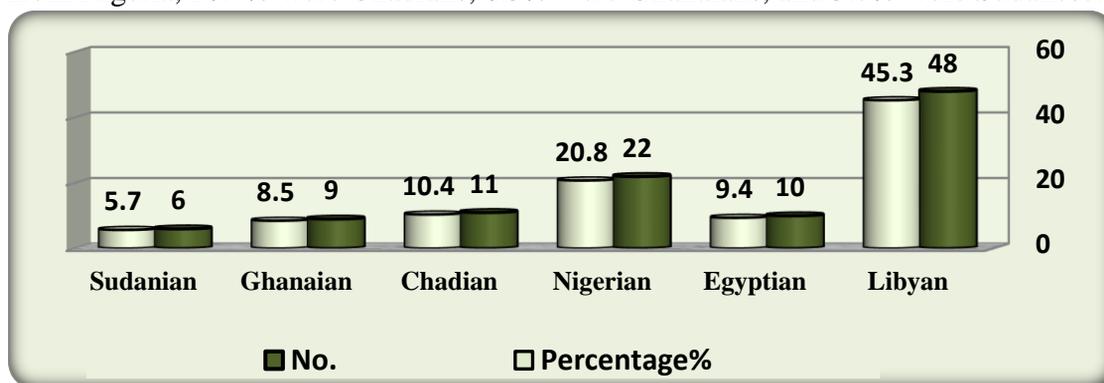


Figure (4): Repetitive distribution and percentage of sample individuals according to nationality.

5: Distribution of sample members according to the type of hepatitis:

Table (5): repetitive distribution and percentage of the sample individuals according to the type of hepatitis:

Type of hepatitis	No.	Percentage
Hepatitis C virus	33	31.1
Hepatitis B virus	69	65.1
Human Immunodeficiency Virus	4	3.8
Total	106	100

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From Table No. (5), it was found that (33) patients, with a rate of (31.1%), were infected with hepatitis C, while (65.1%) were infected with hepatitis B, and (3.8%) were infected with HIV.

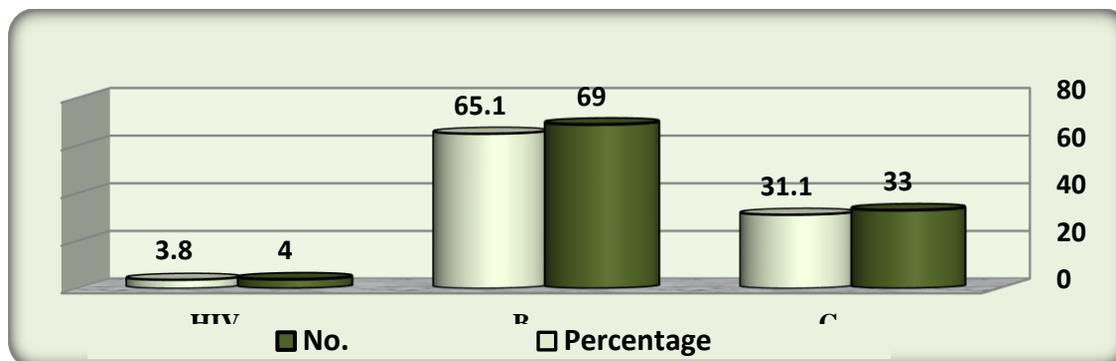


Figure (5) Repetitive Distribution and percentage of sample individuals according to the type of hepatitis.

The difference in the type of hepatitis virus according to nationality.

Table 6: Results of the Chi-square test to determine the difference in the type of hepatitis virus according to nationality:

			Type of infection			Total	P-Value Sig.
			HCV	HBsAg	HIV		
Nationality	Libyan	Count	15	33	0	48	0.002
		% within Nationality	31.3%	68.8%	0.0%		
	Egyptian	Count	7	1	2		
		% within Nationality	70.0%	10.0%	20.0%		
	Nigerian	Count	8	14	0		
		% within Nationality	36.4%	63.6%	0.0%		
	Chadian	Count	1	9	1		
		% within Nationality	9.1%	81.8%	9.1%		
Ghani	Count	2	7	0			
	% within Nationality	22.2%	77.8%	0.0%			
Sudani	Count	0	5	1			
	% within Nationality	0.0%	83.3%	16.7%			
Total		Count	33	69	4	106	
		% within Nationality	31.1%	65.1%	3.8%	100.0%	
Chi ² Calculated = 28.056 df=10 Chi ² Tabular 18.31							

P-value ≤ 0.05 is significant; P-value ≤ 0.01 is highly significant; P-value > 0.05 is non-significant.

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The tabulated data presented that the P value was equal to 0.002, less than 0.05, and that there were highly statistically significant differences between the types of hepatitis infection according to nationality. It was found that most of the infections with hepatitis C type were for patients of Egyptian nationality, while other nationalities had a high incidence of hepatitis B type.

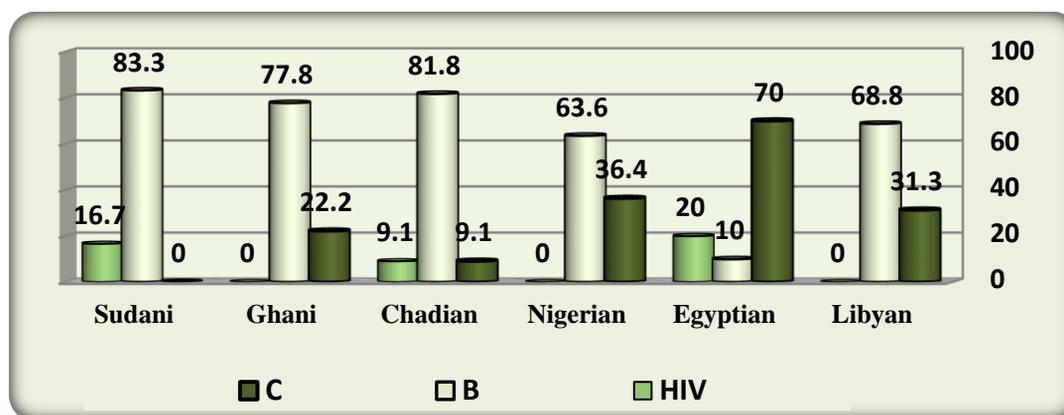


Figure 6: Result of the difference in the type of hepatitis virus according to nationality.

The difference in the type of hepatitis virus according to gender.

Table 7: Results of the Chi-square test to determine the difference in the type of hepatitis virus according to gender:

			Type of infection			Total	P-Value Sig.
			HCV	HBsAg	HIV		
Gander	male	Count	30	65	4	99	0.709
		% within Gander	30.3%	65.7%	4.0%		
	Female	Count	3	4	0		
		% within Gander	42.9%	57.1%	0.0%		
Total		Count	33	69	4	106	
		% within Gander	31.1%	65.1%	3.8%		
Chi ² Calculated = 0.687 df=2 Chi ² Tabular 5.99							

P-value ≤ 0.05 is significant; P-value ≤ 0.01 is highly significant; P-value > 0.05 is non-significant.

The results revealed that the P value was equal to 0.709, which was more than 0.05, and that there weren't statistically significant differences between the types of hepatitis infection according to gender.

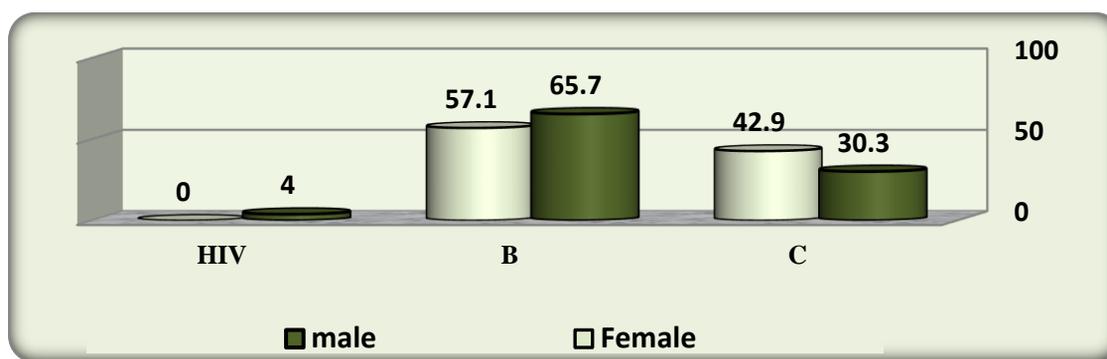


Figure 7: Result of the difference in the type of hepatitis virus according to gender. The difference in the type of hepatitis virus according to age:

Table 8: Results of the Chi-square test to determine the difference in the type of hepatitis virus according to age:

			Type of infection			Total	P-Value Sig.
			HCV	HBsAg	HIV		
Age	less than 20	Count	1	3	0	4	0.141
		% within Age	25.0%	75.0%	0.0%	100.0%	
	20 to less than 30	Count	12	25	2	39	
		% within Age	30.8%	64.1%	5.1%	100.0%	
	30 to less than 40	Count	16	28	2	46	
		% within Age	34.8%	60.9%	4.3%	100.0%	
	40 to less than 50	Count	1	13	0	14	
		% within Age	7.1%	92.9%	0.0%	100.0%	
	50 years and more	Count	3	0	0	3	
		% within Age	100.0%	0.0%	0.0%	100.0%	
	Total	Count	33	69	4	106	
		% within Age	31.1%	65.1%	3.8%	100.0%	
			Chi ² Calculated = 12.23 df=8 Chi ² Tabular = 15.51				

P-value ≤ 0.05 is significant; P-value ≤ 0.01 is highly significant; P-value > 0.05 is non-significant.

The results displayed that the P value was equal to 0.141, which was more than 0.05, and that there weren't statistically significant differences between the types of hepatitis infection according to age.

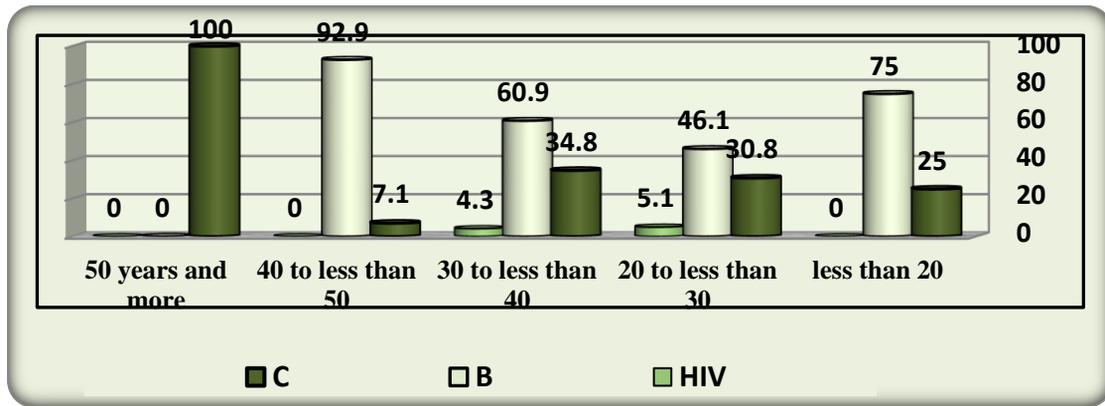


Figure 8: Result of the difference in the type of hepatitis virus according to age.

The difference in the type of hepatitis virus according to occupation:

Table 9: Results of the Chi-square test to determine the difference in the type of hepatitis virus according to occupation:

			Type of infection			Total	P-Value Sig.
			HCV	HBsAg	HIV		
occupation	Labor	Count	17	34	3	54	0.875
		% within occupation	31.5%	63.0%	5.6%	100.0%	
	Free work	Count	5	11	1	17	
		% within occupation	29.4%	64.7%	5.9%	100.0%	
	Employee	Count	10	23	0	33	
		% within occupation	30.3%	69.7%	0.0%	100.0%	
	Non-work	Count	1	1	0	2	
		% within occupation	50.0%	50.0%	0.0%	100.0%	
Total		Count	33	69	4	106	
		% within occupation	31.1%	65.1%	3.8%	100.0%	
Chi ² Calculated = 2.445 df = 6 Chi ² Tabular = 12.59							

P-value ≤ 0.05 is significant; P-value ≤ 0.01 is highly significant; P-value > 0.05 is non-significant.

The results suggested that the P value was equal to 0.875, which was more than 0.05, and that there weren't statistically significant differences between the types of hepatitis infection according to occupation.



Figure 9: Result of the difference in the type of hepatitis virus according to occupation.

Discussion: This survey investigated the following points: estimating the proportion and frequency of hepatitis B, C, and HIV virus infections that happened among citizens and foreign patients; detecting hepatitis B, C, and HIV viruses; and finding out the relationship between infection frequency and risk factors for the study. Hepatitis C virus (HCV) and hepatitis B virus (HBV) are bloodborne viruses that emerged as the leading cause of mortality and morbidity due to liver cancer in the last two decades. One of the most important viruses that has a common transmission pathway with these agents is the human immunodeficiency virus (HIV). HIV belongs to the Retroviridae family, which causes the acquired immunodeficiency syndrome (AIDS).

(Yousefpouran, S., *et al.*, 2020).

The aim of this study was to estimate the prevalence of HBV, HCV, and HIV infection among citizens and foreign patients in the Tarhouna clinic and compare it with the study variables (age, gender, type of infection, and type of infection).

In the current study, 106 participants had hepatitis B, C, and HIV viruses, and the rate was 100%. Of them, 99 were males, with a percentage of 93.4%, and 7 were females, with a percentage of 6.6%. The study offered that the number of infected males was higher compared to females.

These results were in agreement with previous studies in Iraq (Khalaf, A. A., & Hussein, K. R., 2022) and in Egypt (Ahmed H. A., *et al.*, 2015), but this finding disagrees in Somalia (Mohamed O.O., *et al.*, 2021).

In this study, the number of infected patients with hepatitis C was 33 (31.1%). Including (30) males and (3) females, at a rate of (30.3%) for males and (42.9%) for females. The number of injured patients with hepatitis B is 69 (65.1%), including 65 males (65.7%) and 4 females (57.1%). These results are in agreement with previous studies in Yemen (Almezgagi, M., *et al.* 2020).

While the results of the study disagree with previous studies on HBV in Nairobi (Langat, B., *et al.*, 2023) and HCV in Kazakhstan (Jumabayeva, A., *et al.*, 2022). The number of injured patients with HIV is (4) (3.8%), including (4) males (4%) and no injured females (0%).

These findings are in agreement with previous studies in western Saudi Arabia (Farahat, F. M., *et al.* 2020). While the results of the study disagree with previous studies in sub-Saharan Africa by (Haeuser, E., *et al.*, 2022). In this study, the number of infected patients with hepatitis B viruses was based on nationality. Including (33) Libyan (68.8%), (1) Egyptian (10%), (14) Nigerian (63.6%), (9) Chadian (81.8%), (7) Ghanaian (77.8%), and (5) Sudanian (83.3%). The number of injured patients with hepatitis C is 100%, including 15 Libyans (31.3%), 7 Egyptians (70%), 8 Nigerians (36.4%), 1 Chadian (9.1%), 2 Ghanians (22.2%), and 0 Sudanese (0%). The number of injured patients with HIV according to nationality has been distributed as follows: (0) Libyan (0%), (2) Egyptian (20%), (0) Nigerian (0%), (1) Chadian (9.1%), (0) Ghanaian (0%), and (1) Sudanian (16.7%). These results are in agreement with previous studies in Darna (Ibrahim, H. K., *et al.*, 2022). While the results of the study disagree with previous studies in the Samtah-Jazan Region by (Mobarki, A. A., *et al.*, 2022).

The hepatitis B and C viruses are primarily targeted at individuals aged 30–40, as per previous studies in Yemen and Nawabshah, Sindh, Pakistan. The findings agree with previous research in Yemen (Almezgagi, M. M., *et al.*, 2020), while they differ from those in Nawabshah, Sindh, and Pakistan (Samo, A. A., *et al.*, 2021). The hepatitis C virus, on the other hand, targets individuals aged 20–40, as per previous studies in Yemen. As for the HIV virus, it targets the age group of 20 to less than 40 years. In proportion to 3.8%. These results are in agreement with previous studies on HIV in the Balearic Islands by (Mercadal-Orfila, G., *et al.*, 2022). While the results of the study disagree with previous studies in western Saudi Arabia by (Farahat, F. M., *et al.*, 2020). Conclusion: The study reveals significant differences in hepatitis infection types based on nationality, with hepatitis C being the most prevalent in Egyptian patients, while other nationalities have a higher incidence of hepatitis B. No significant differences were found based on gender, age, or occupation.

Recommendations: The study suggests larger research and periodic screenings for hepatitis B, C, and HIV in Libya to determine prevalence. The ELISA method should be used for screening, and medical examinations should be conducted for all professions. Vaccination, antiviral medications, and antiretroviral therapy are crucial.

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