Alqalam Journal of Medical and Applied Sciences. 2025;8(1):359-366
https://doi.org/10.54361/ajmas.258152

Original article

Prevalence of Hepatitis C Virus and HIV among Libyans and Expatriates (Foreigners) in the City of Zawia, Libya

Asmahan Alfard[1], Fawzia Kahbar[1], Himedah Fheel Alboom[1], Najat Mansour[2], Mabroukah Khalleefah[2]

[1]Department of Biology, Faculty of Education Zawia, University of Zawia, Zawia City, Libya
[2]Department of General and Basic Materials, Faculty of Dentistry, University of Zawia, Zawia City, Libya
***Corresponding Email**. m.khalleefah@zu.edu.ly*

Abstract
Libya has the longest coastline in the Mediterranean basin, which increases the risk of the spread of hepatitis C virus and AIDS. This is a public health problem that affects most of the world's population, including Libya, as the hepatitis C virus is considered the leading cause of cirrhosis and liver cancer worldwide. HIV/AIDS is a disease that puts the infected person at risk and therefore death. Liver cancer is not the most common cause of death, but it is the second most common cause of death worldwide. Therefore, the study aimed to determine the prevalence of hepatitis C and HIV among Libyans and foreigners arriving in Libya. The study was conducted in 2023 on Libyans and expatriates (foreigners) in the city of Zawia in the reference laboratory. Samples were collected, then 5 ml of the patient's blood was taken and placed in a centrifuge to separate the serum, and 50 microns of it were transferred to the test strip using the RABID method. ELISA was also used. The modes of transmission of the hepatitis C virus and human immunodeficiency virus (AIDS) are blood and drug use. The prevalence rate of hepatitis C virus among Libyans was 0.016%, and among men, it was 51.21% higher than among women. The age group of 21 to 30 years was also the most prevalent. The prevalence rate of HIV was 0.04%, and among men, it was 63.63%. The age group of 31 to 40 years was the most prevalent, with a higher prevalence rate than among women. As for Libyans who underwent the test for a specific purpose, the majority of them did so because of marriage, a rate of 56.09%. Among expatriates (foreigners), the prevalence rate of hepatitis C was 0.05%. Its rate among men was higher than among women, at 86.66%. The age group of 21 to 30 years was the most prevalent. As for HIV, it was 0.06%, and in the age group of 10 to 20 years, its rate among men was 100%. Most of the samples were among expatriates, most of them for treatment purposes, at 53.33%. Regarding people infected with the hepatitis C virus from different countries, the majority of those infected came from Egypt, 60%, while those infected with HIV came from Nigeria, 50%. The hepatitis C virus is a serious disease that is transmitted through blood. As arrivals from most African countries or other countries are high, it is because the region is known for the spread of hepatitis C virus. The study showed that the prevalence of hepatitis C is 0.50%, and the incidence of HIV/AIDS is 0.06%, both among men.
Key Words. Hepatitis C Virus, Infection, AIDS, Foreigners, ELISA Libya, Prevalence.

Introduction

Viral hepatitis and AIDS are both global health problems due to their widespread prevalence worldwide, which is accompanied by social, economic, and health factors. Viral hepatitis is spreading widely under uncontrolled conditions in most countries of the world, especially in regions such as Africa and other developing countries [1]. Hepatitis virus infection causes inflammation of the liver due to infection with types A, B, C, D, and E viruses. It can be chronic or acute, as hepatitis B (HBV) and C (HCV) viruses can cause chronic liver diseases that sometimes remain latent for several years. As a result, the infected patient is at risk of liver cirrhosis or liver cancer, which leads to death. Approximately 32 million people are chronically infected with hepatitis C virus in Asia and more than 6 million in Latin America. Africa also accounts for about 20% of hepatitis C virus infections worldwide [2]. Deaths associated with HCV and HBV reached 96% in 2016. The World Health Organization has considered viral hepatitis a public health threat by 2030 and has therefore aimed to reduce the incidence and mortality rate of HCV and HBV to 65%. The World Health Organization estimated in 2019 that HCV infection affected 57.8 million patients with a prevalence rate of 0.75%, resulting in approximately 1 million deaths worldwide [3]. About 71 million people worldwide are infected [4]. It is a leading cause of liver cirrhosis and hepatocellular carcinoma and its incidence continues to increase in people with advanced liver disease [5-7].

It is noteworthy that the risk of liver-related death is approximately 26.5 times higher, while the risk of non-liver-related death is approximately 1.8 times higher [8]. The hepatitis C virus infects approximately 200 million people worldwide [9]. Its prevalence may be increasing in some countries to a greater extent than that of hepatitis B, particularly among people at risk of contracting these viruses [10]. Today, HCV is also transmitted through intravenous injection (PWID), leading to a disproportionate spread of HCV in different population groups, such as people who inject drugs [11]. HCV is also transmitted through contact with infected blood and blood from various bodily fluids [12]. And those who have sex with men, in a broader

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***Received**: 27-12-2024 - **Accepted**: 22-02-2025 - **Published**: 17-02-2025*

sense, men with men (MSM), are also held in prison because of the hepatitis C virus [13]. In some countries, infection can occur in hospitals [14]. On the other hand, the success rate of HCV treatment has increased with the discovery of antivirals [15]. On the other hand, with the emergence of drugs, these viruses could be able to develop to increase resistance to any type of treatment [16]. The first reports of the human immunodeficiency virus (HIV) began to appear in 1981, when statistics indicated that approximately 37 million people had died from this virus. According to 2019 statistics, 1.7 million people were infected with this virus, resulting in the deaths of 690,000 people [17]. The world is currently working to reduce the number of HIV and HCV cases by 2030, as these viruses are dangerous to public health. The World Health Organization (WHO) and the United Nations program have worked towards certain goals that encourage early diagnosis and treatment and strive to reduce deaths to limit the disease [18].

Prompt diagnosis of hepatitis C or HIV infection significantly improves overall health, reduces liver fibrosis, and allows treatment within 24 weeks, resulting in a 90% cure for HCV and 98% cure for HIV [19]. The European Centre for Disease Prevention and Control (ECDC) reports that viral hepatitis is more prevalent in Eastern and Southern Europe and that in the EU/EEA the total number of people living with hepatitis C or even B virus has not been identified in recent years and that approximately 30,000 new cases of HIV are reported each year in the EU, which means 6 new cases per 100,000 people each year, while this figure has decreased in recent years due to the increase in the number of drugs used for these viruses [20]. Libya has a long coastline on the Mediterranean Sea and is the second largest country in Africa in terms of land area. It is surrounded by several countries where the hepatitis C virus is endemic. This indicates a great opportunity for transmission of this virus in Libya [21].

Libya is a wealthy country, making it a place of residence for many African and other workers. The prevalence rate of hepatitis C virus was 1.2%, depending on the type of region or the density of different workers in the region [22]. The migration factor is considered one of the most important factors in the spread of the hepatitis C virus in Libya. Some studies conducted on African immigrants in Tripoli reported that the rate reached 26%, the highest being in Egypt (18.7%), while in West Africa it was 14.1% [23]. More than 28 million people suffer from chronic hepatitis C virus infection in Africa [24, 25]. Through some studies conducted in Libya, some of them reported that the spread of the hepatitis C virus among different Libyan populations varies depending on some of the issues through which it is transmitted [26]. The recent study focused on the complete genotypes of hepatitis C virus in Libya, while HCV genotype 4 is the most common, followed by HCV genotype 1, followed by other less common genotypes [27]. The total number of people living with HIV, 72% and thus 2.0 million deaths due to HIV worldwide, and 1.9 million infections in 2007 and deaths continued during this period to reach 2 million [28].

AIDS is considered a national and international humanitarian security problem that is transmitted in several ways, including through drug addiction, sexual problems and malnutrition. Approximately 2.4 million people are infected with HIV each year [29]. The World Health Organization reported that in 2022, approximately 242,000 people died from hepatitis C, and these deaths were the result of cirrhosis of the liver and therefore cancer of the liver cells [30]. HIV/AIDS is a serious and deadly disease that exposes people infected with this type of virus to life-threatening types of infections. Living with this virus impairs and disrupts mental and social health and has a major impact on physical health, as everyone's treatment of infected people is different [31]. This virus attacks the body's immune cells, making it a formidable enemy. And the body's defense systems are thus destroyed. Thus, the spread of this epidemic and its impact increases with all the circumstances that allow it to grow [32]. It is difficult to eliminate both HCV and HIV because there is no single program to eliminate them. Each country must therefore design its own approach to try to stop their spread and treat those infected. This study aims to determine the prevalence of hepatitis C and HIV among Libyans and foreigners in the city of Zawia, Libya.

Methods

Study setting

This study was conducted at the Zawia City Reference Laboratory during the period from January 2023 to December 2023. The target population consisted of Libyans, numbering 25,486, and expatriates (foreigners) numbering 2,986. Both samples included men and women. The study included individuals aged 10 to 100 years. A venous blood sample was taken from each patient to screen for hepatitis C and HIV/AIDS.

Study setting and population

The Al-Zawia Reference Laboratory in Libya is one of the service centres in the Al-Zawia region and neighboring cities. The hepatitis C virus analysis at the Al-Zawia Reference Laboratory is one of the routine tests performed at the centre, in addition to the human immunodeficiency virus (HIV), in order to protect healthcare professionals as well as patients. This procedure is global and aims to protect. Hepatitis C and HIV are both detected by blood tests using the RABID test. If the test result is positive, a test is performed.

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Received*: 27-12-2024 -* ***Accepted****: 22-02-2025 -* ***Published****: 17-02-2025*

Enzyme-linked immunosorbent assay (ELISA) [33]. In this study, both methods were used in accordance with the methods followed in the reference laboratory in Zawia, Libya.

Blood test by rapid test Method (RABID)

In this method, 3 ml of the patient's blood were taken into a test tube and placed in a centrifuge to separate the serum. Then, 50 microns of blood were transferred to the slide (test strip) and left for 10 to 20 minutes. A red line appears in the positive case on the test strip. When a red line does not appear, the result is negative.

Enzyme linked immunosorbent assay (ELISA)

A total of 3 ml of the patient's blood was taken and placed in a test tube, then placed in a centrifuge to obtain the serum. Then, 10 microns of serum were taken and 50 microns of conjugate enzyme Then it was placed in the incubator at 37 degrees Celsius for 30 minutes. After that, the sample was washed with a virus-specific solution and then 50 microns of substrate It was placed in the incubator for 10 minutes, then 50 microns of stop solution. In order to stop the reaction after reading the results, a blue colour appears for a positive result and a transparent colour for a negative result.

Results

Among the 25,486 Libyans who requested testing at the Zawia Reference Medical Laboratory in 2021, 41 of them were infected with the hepatitis C virus, and the number of infected cases was 21 men, while the number of infected cases was 20 women. As for cases of AIDS virus infection among citizens, there were 11 cases of infection, including 7 men and 4 women. As for the number of expatriates (foreigners) who requested tests for the year 2021, it amounted to 2986 cases, as the number of people infected with hepatitis C virus type 15 was 13 cases, and the number of women was 2 cases. As for the cases of AIDS virus infection among foreign expatriates, there were two cases of infection, and they were male, while no cases were recorded among women (Table 1).

Table 1. Distribution of patients, Libyans and foreigners, according to virus type, gender and percentages in the study area

Type of virus	Libyans		
	Female N (%)	Male N (%)	Total
HIC	20 (48.78%)	21 (51.21%)	41
HIV	4 (36.36%)	7 (63.63%)	11
Arrivals (Foreigners)			
HIC	2 (13.33%)	13 (86.66%)	15
HIV	0	2 (100%)	2

Table 2 showed the distribution of Libyan patients by age group: the relationship between patients infected with each of the viruses (HCV, HIV) and age. The prevalence of HCV was relatively high in the 20-30 age group, reaching 39.02% (16/41). In the 91-100 age group, the prevalence of HCV decreased to 2.43% (1/41), while in the 81-90 age group, no cases were recorded (0% HCV). The prevalence of HIV was relatively high in the 31-50 age group, reaching 36.36% (1 1/4). In the 51-60 age group, the HIV prevalence rate decreased relatively, reaching 18.18% .

Table 2. Distribution of Libyan patients infected with hepatitis C (HCV) and HIV by age groups in the study area

Age	Hepatitis C (HCV)		AIDS (HIV)	
	Frequency	Percentage %	Frequency	Percentage %
10 – 20	0	0%	0	0%
21 – 30	16	39.02%	3	27.27%
31 – 40	8	19.51%	4	36.36%
41 – 50	7	17.1%	2	18.18%
51 – 60	5	12.19	2	18.18%
61 -70	3	7.32%	0	0%
71 -80	1	2.44%	0	0%
81 – 90	0	0%	0	0%
91 – 100	1	2.43%	0	0%
Total	41	100%	11	100%

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Received*: 27-12-2024 -* ***Accepted****: 22-02-2025 -* ***Published****: 17-02-2025*

https://doi.org/10.54361/ajmas.258152

Table 3 showed that after examination, the number of Libyans infected with the C virus who were tested due to marriage was 23 cases, or 56.09%, followed by the number of people infected with the C virus who were tested due to treatment, which was 13, or 31.70%, and those infected due to a health certificate were 5, or 12.19%, of infections. The number of Libyans infected with HIV (AIDS) who were tested for treatment was 5 cases, or 45.99%, followed by the number of people infected with HIV who were tested for marriage, which was 4, or 36.36%, and the number of infected people who were tested to obtain a health certificate was 2, and the infection rate was 8.18%.

Table 3. Percentages of Libyan patients with HCV and HIV according to the reason for the analysis

Reason for the analysis	HCV		HIV	
	Frequency	Percentage %	Frequency	Percentage %
Marriage	23	56.09%	4	36.36%
Treatment	13	31.70	5	45.99%
Health certificate	5	12.19	2	18.18%
Total	41	100%	11	100%

Table 4 showed the distribution of incoming patients (foreigners) by age group: the relationship between patients infected with each of the viruses (HCV, HIV) and age. The prevalence of HCV was relatively high in the age group of 21 to 30 years, reaching 27.27% (11/3). In the age group of 41 to 50 years (11/3), the prevalence of HCV decreased, reaching 61 to 70 (11/1), while in the age group of 51 to 60 years, no cases were recorded, 0% of HCV. The prevalence of HIV was relatively high in the age group of 10 to 20 years, reaching 100% (2/2). In the other age groups, no cases were recorded.

Table 4. Distribution of the percentage of arrivals (Foreigner) patients with HCV and HIV according to age groups in the study region

Age	hepatitis C (HCV)		AIDS (HIV)	
	Frequency	Percentage %	Frequency	Percentage %
10 -20	2	18.18%	2	100%
21 – 30	3	27.27%	0	0%
31 – 40	2	18.18%	0	0%
41 – 50	3	27.27	0	0%
51 – 60	0	0%	0	0%
61 -70	1	9.09%	0	0%
71 -80	0	0%	0	0%
81 – 90	0	0%	0	0%
91 – 100	0	0%	0	0%
Total	11	100%	2	100%

Table 5 showed that after examination, the number of expatriates (foreigners) infected with the C virus who underwent testing for treatment was 8 cases, or 53.33%, followed by the number of those infected with the C virus who underwent testing for marriage, which was 4, or 26.66%, and those infected for the purpose of a health certificate were 3 cases, or 20%. As for the number of expatriates infected with HIV (AIDS) who underwent testing for treatment and a health certificate, there was 1 case of infection for each of them, which is equivalent to 50%. As for those who underwent testing for marriage, no infections were recorded.

Table 5. Percentages of arrivals (Foreigner) patients with HCV and HIV according to the Reason for the analysis

Reason for the analysis	Hepatitis C (HCV)		AIDS (HIV)	
	Frequency	Percentage %	Frequency	Percentage %
Marriage	4	26.66%	0	0%
Treatment	8	%53.33	1	50%
Health certificate	3	20%	1	50%
Total	15	100%	2	100%

Table 6 showed that among the people infected with hepatitis C virus among expatriates (foreigners), the highest infection was recorded in Egypt, with a rate (15/9) of 60%, while the other countries recorded the

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Received*: 27-12-2024 -* ***Accepted****: 22-02-2025 -* ***Published****: 17-02-2025*

lowest infection rate of C virus (15/1) with a rate of 6.66%. Among the people infected with HIV virus, ADIS recorded only one infection in Sudan and Nigeria (2/1) with a rate of 50%.

Table 6. Distribution of percentages of patients by country infected with hepatitis C (HCV) and HIV imported (foreigners)

Countries	hepatitis C (HCV)		ADIS (HIV)	
	Frequency	Percentage %	Frequency	Percentage %
Egypt	9	60%	0	0%
Nigeria	1	6.66%	1	50%
Morocco	1	6.66%	0	0%
Niger	1	6.66%	0	0%
Ukraine	1	6.66%	0	0%
Tunisia	1	6.66%	0	0%
Palestine	1	6.66%	0	0%
Sudan	0	0%	1	50%
Total	15	100%	2	100%

Discussion

This study examined the number of Libyans (25,486) and expatriates (foreigners) (2,986) who visited the reference laboratory in the city of Zawia, Libya, regarding the rate of hepatitis C virus and human immunodeficiency virus (HIV) AIDS infection among those who attended the reference laboratory for medical reasons from January to December 2021. The study reported a rate of 0.16% of positive cases of hepatitis C virus. In addition, the percentage of cases of acquired immunodeficiency virus (AIDS) infection is 4.0%, and according to many studies, 15 to 45% of people infected with hepatitis C virus automatically recover from this virus [34]. These results are consistent with [35]. He pointed out that the percentage of cases studied was recorded at 0.17%.

The infection rate among Libyans with hepatitis C differs in percentages between men and women, who recorded the highest infection rate of 51.21% among men compared to women. Furthermore, the age group of 21-30 years recorded the highest infection rate of 39.02%. As for expatriates, the study revealed that cases of hepatitis C virus infection were recorded at 0.50%, and the HIV/AIDS infection rate was 0.06%, among men. It should be noted that studies have shown that since about 2011, there has been a significant decrease in the incidence of hepatitis C cases. This may be due to problems and poor quality of screening services for this type of analysis. Many problems contribute to the increase in the rate of spread of the hepatitis C virus, including the lack of polymerase chain reaction machines, the lack of screening and health services in this area, the lack of sufficient expertise in documentation and data processing, and the lack of human [36]. On the other hand, in 2018, the Egyptian state and health system were able to diagnose and treat most of the patients with the hepatitis C epidemic, as up to 50 million people were screened in a short period in an attempt to reduce the disease [37].

The results indicated that the HIV prevalence among Libyans visiting the reference laboratory was 63.63%, and this high percentage does not correspond to [38]. Which indicates that only one case has been recorded, and the same study indicates that the rate of hepatitis C has reached 90%. While in 2014, 38.7% of cases were recorded in the Eastern region in general, and the reason for the prevalence rate during this period was due to injecting drug users, who alone recorded 45.2% of cases. As for its prevalence in sexual cases, the prevalence rate was 27.7% of cases, and it agrees with the current study in its high percentage, and differs from the study in its prevalence in the middle age group of 30 to 39 years, followed by 40 to 49 years [39, 40]. The rate of hepatitis C-positive individuals was found to vary across nationalities. The highest percentage of infection was found among Egyptians (9 cases, 60%), while the percentages were lower among other nationalities, which is consistent with [35]. Which revealed that the number of Egyptians infected with hepatitis C was (50 cases, 8.2%).

Currently, every year, a large number of migrants from neighboring countries flow into Libya and there is no precautionary screening after they enter Libya to detect hepatitis C and HIV to support public health and document the situation of migrants. Detection and diagnosis of HIV and hepatitis C depend on immunological tests, including ELISA tests, which are considered the most common, as reported in this study. This is consistent with many studies that this type of test is the most important and sensitive [41, 42]. Regarding the mechanism of virus transmission and methods of preventing hepatitis C virus and human immunodeficiency virus, Libya is considered one of the countries where these viruses are endemic, as it is a place of immigration from various countries. Therefore, many studies and investigations must be conducted and mechanisms must be followed to eliminate these viruses.

Many studies have shown that the impact of HIV/AIDS on human health in general and humans in particular has been devastating in some countries of the world such as Africa and others, where the number

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Received*: 27-12-2024 -* ***Accepted****: 22-02-2025 -* ***Published****: 17-02-2025*

of middle-aged people has increased and the percentage of decline in this age group has been 20%, which has transformed the health situation into an epidemic. As for deaths, the difference was clear, since deaths resulting from infection with the AIDS virus decreased from 2.3 million in 2005 to 1.6 million in 2012. 70% this year, according to the UNAIDS 2013 report [43, 44].

Conclusion

The hepatitis C virus is a serious disease that is transmitted through blood. As arrivals from most African countries or other countries are high, it is because the region is known for the spread of hepatitis C virus. The study showed that the prevalence of the hepatitis C is 0.50%, and the incidence of HIV/AIDS is 0.06%, both among men. Many people are looking for a better world and a better life, away from disease, poverty and war. That is why, for various reasons, we see the need to offer hepatitis testing to immigrants in general and HIV as well. The Libyan authorities must offer testing and vaccinations against hepatitis and HIV and provide the appropriate means for testing and treatment. Libya can be considered an area of low to moderate prevalence of hepatitis B virus infection, with lower rates in younger age groups, and an area of low prevalence of hepatitis C. The prevalence of hepatitis B and C in Libya is not uniform, with indications of higher rates in some neighboring countries.

Conflict of interest. Nil

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Received: *27-12-2024* - ***Accepted***: *22-02-2025* - ***Published***: *17-02-2025*

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Received*: 27-12-2024 -* ***Accepted****: 22-02-2025 -* ***Published****: 17-02-2025*

https://doi.org/10.54361/ajmas.258152

المستخلص

تتمتع ليبيا بأطول خط ساحلي في حوض البحر الأبيض المتوسط، مما يزيد من خطر انتشار فيروس التهاب الكبد الوبائي والإيدز. وهذه مشكلة صحية عامة تؤثر على معظم سكان العالم، بما في ذلك ليبيا، حيث يعتبر فيروس التهاب الكبد C السبب الرئيسي لتليف الكبد وسرطان الكبد في جميع أنحاء العالم. فيروس نقص المناعة البشرية/الإيدز هو مرض يعرض الشخص المصاب للخطر وبالتالي الموت. سرطان الكبد ليس السبب الأكثر شيوعا للوفاة، ولكنه ثاني أكثر سبب للوفاة شيوعا في جميع أنحاء العالم. ولذلك هدفت الدراسة إلى تحديد مدى انتشار التهاب الكبد الوبائي وفيروس نقص المناعة البشرية بين الليبيين والأجانب الوافدين إلى ليبيا. أجريت الدراسة عام 2023 على الليبيين والمغتربين (الأجانب) في مدينة الزاوية في المختبر المرجعي. تم جمع العينات، ثم أخذ 5 مل من دم المريض ووضعها في جهاز الطرد المركزي لفصل المصل، ونقل 50 ميكرون منه إلى شريط الاختبار بطريقة RABID. تم استخدام ELISA أيضًا. طرق انتقال فيروس التهاب الكبد C وفيروس نقص المناعة البشرية (الإيدز) هي تعاطي الدم والمخدرات. بلغ معدل انتشار فيروس التهاب الكبد C بين الليبيين 0.016%، وبين الرجال أعلى منه بين النساء بنسبة 51.21%. وكانت الفئة العمرية من 21 إلى 30 عامًا هي الأكثر انتشارًا أيضًا. وبلغت نسبة انتشار فيروس نقص المناعة البشرية 0.04%، وبين الرجال 63.63%. وكانت الفئة العمرية من 31 إلى 40 سنة هي الأكثر انتشارا، مع معدل انتشار أعلى منه بين النساء. أما الليبيون الذين خضعوا للاختبار لغرض محدد، فإن غالبيتهم فعلوا ذلك بسبب الزواج بنسبة 56.09%. أما بين الوافدين (الأجانب)، فقد بلغت نسبة انتشار التهاب الكبد الوبائي (سي) 0.05%. وكانت نسبته بين الرجال أعلى منها بين النساء حيث بلغت 86.66%. وكانت الفئة العمرية من 21 إلى 30 سنة هي الأكثر انتشارا. أما فيروس نقص المناعة البشرية فقد بلغت 0.06%، وفي الفئة العمرية من 10 إلى 20 سنة بلغت نسبته بين الرجال 100%. وكانت معظم العينات من الوافدين، وأغلبها لأغراض العلاج، بنسبة 53.33%. وفيما يتعلق بالمصابين بفيروس التهاب الكبد الوبائي سي من دول مختلفة، فإن غالبية المصابين جاءوا من مصر بنسبة 60%، بينما جاء المصابون بفيروس نقص المناعة البشرية من نيجيريا بنسبة 50%. فيروس التهاب الكبد C هو مرض خطير ينتقل عن طريق الدم. نظرًا لأن عدد الوافدين من معظم البلدان الأفريقية أو البلدان الأخرى مرتفع، فذلك لأن المنطقة معروفة بانتشار فيروس التهاب الكبد الوبائي. وأظهرت الدراسة أن نسبة انتشار التهاب الكبد الوبائي سي تبلغ 0.50%، ونسبة الإصابة بفيروس نقص المناعة البشرية/الإيدز 0.06%، سواء بين الرجال.

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Received: *27-12-2024* - ***Accepted***: *22-02-2025* - ***Published***: *17-02-2025*