

prevalence of viral Hepatitis on End Stage kidney Disease patients on Dialysis in Tarhana

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معدل انتشار التهاب الكبد الفيروسي لدى مرضى القصور الكلوي المزمن في المرحلة النهائية الخاضعين للعلاج بغسيل الكلى في مدينة ترهونة، ليبيا

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Abstract

This study aimed to determine the prevalence of viral hepatitis among patients with end-stage kidney disease undergoing hemodialysis in Tarhuna. A descriptive cross-sectional design was used, including a total sample of 140 patients. The results showed that the prevalence of hepatitis B virus infection was 6.4%, while hepatitis C virus infection was detected in 3.6% of patients. HIV infection was very low, Most patients received three hemodialysis sessions per week, and hypertension was the most common associated chronic condition. The study highlights the importance of regular screening, hepatitis B vaccination, and strict adherence to infection-control measures in dialysis units to reduce viral transmission and improve patient safety.

Keywords: Viral hepatitis, End-stage kidney disease, Hemodialysis, Hepatitis B virus, Hepatitis C virus.

المخلص

هدفت هذه الدراسة إلى تحديد مدى انتشار التهاب الكبد الفيروسي بين مرضى الفشل الكلوي النهائي الخاضعين للغسيل الكلوي في مدينة ترهونة. اعتمدت الدراسة على المنهج الوصفي المقطعي، وشملت عينة مكونة من 140 مريضاً، أظهرت النتائج أن نسبة الإصابة بفيروس التهاب الكبد B بلغت 6.4%، بينما بلغت نسبة الإصابة بفيروس التهاب الكبد C نحو 3.6%، كما بينت النتائج أن معظم المرضى يخضعون

لثلاث جلسات غسيل أسبوعياً، وأن ارتفاع ضغط الدم كان من أكثر الأمراض المصاحبة شيوعاً. وتؤكد الدراسة أهمية الفحص الدوري، والتطعيم ضد التهاب الكبد B، والالتزام بإجراءات مكافحة العدوى داخل وحدات الغسيل الكلوي للحد من انتقال العدوى وتحسين سلامة المرضى.

الكلمات المفتاحية: التهاب الكبد الفيروسي، الفشل الكلوي النهائي، الغسيل الكلوي، فيروس التهاب الكبد B، فيروس التهاب الكبد C.

Introduction

End-stage kidney disease (ESKD) represents the final and most severe stage of chronic kidney disease, in which renal function declines irreversibly to a level that is insufficient to maintain normal physiological processes. At this stage, patients require renal replacement therapy, particularly hemodialysis, to sustain life and improve clinical outcomes. Hemodialysis has become one of the most widely used therapeutic interventions for patients with advanced renal failure worldwide; however, its long-term application is associated with several medical complications, among which blood-borne viral infections remain a major concern.

Viral hepatitis, especially hepatitis B virus (HBV) and hepatitis C virus (HCV), continues to pose a significant health challenge among hemodialysis patients. These infections are of particular importance because they may progress to chronic liver disease, liver cirrhosis, hepatocellular carcinoma, and increased mortality. The burden of viral hepatitis is further amplified in patients with kidney failure due to their compromised immune response and the need for repeated exposure to invasive medical procedures.

Patients undergoing maintenance hemodialysis are exposed to multiple factors that increase the likelihood of acquiring viral hepatitis. Frequent vascular access, repeated blood transfusions, prolonged duration of dialysis treatment, and potential healthcare-associated transmission within dialysis facilities have all been identified as important contributors to infection risk. Although considerable improvements have been achieved in infection-control practices, screening protocols, and vaccination programs, the prevalence of HBV and HCV among hemodialysis patients remains higher than that observed in the general population in many countries.

Previous epidemiological studies have demonstrated considerable variation in the prevalence of viral hepatitis among dialysis populations across different regions of the world. Such variations may be attributed to differences in healthcare systems, infection prevention measures, socioeconomic conditions, and the effectiveness of surveillance programs. Consequently, continuous monitoring of viral hepatitis among dialysis patients is essential to evaluate current preventive strategies and identify areas requiring further intervention.

In Libya, limited data are available regarding the prevalence of viral hepatitis among patients receiving hemodialysis, particularly at the local level. Therefore, assessing the burden of HBV and HCV infections in this vulnerable population is of considerable clinical and public health importance. The findings of such investigations may contribute to strengthening infection-control policies, improving patient safety, and reducing the transmission of viral hepatitis within dialysis centers.

Accordingly, the present study was conducted to determine the prevalence of viral hepatitis among end-stage kidney disease patients undergoing dialysis in Tarhuna and to provide updated evidence that may support future preventive and healthcare strategies.

Problem Statement

Patients with End-Stage Kidney Disease (ESKD) who undergo regular hemodialysis constitute one of the groups most vulnerable to blood-borne viral infections, particularly hepatitis B virus (HBV) and hepatitis C virus (HCV). The repeated need for vascular access, frequent contact with dialysis equipment, exposure to blood products, and prolonged dependence on dialysis therapy may increase the risk of acquiring these infections despite the implementation of infection-control measures.

Although considerable progress has been achieved in the prevention and control of viral hepatitis worldwide, HBV and HCV infections continue to represent an important public health concern among hemodialysis patients because of their adverse effects on patient health, treatment outcomes, quality of life, and healthcare costs. Furthermore, viral hepatitis may contribute to additional complications in patients already suffering from advanced renal dysfunction.

In Libya, and particularly in Tarhuna, limited epidemiological data are available regarding the prevalence of viral hepatitis among patients undergoing hemodialysis. The scarcity of local data makes it difficult to accurately assess the magnitude of the problem and evaluate the effectiveness of preventive measures implemented within dialysis centers.

Therefore, this study seeks to address the following research problem:

What is the prevalence of viral hepatitis, particularly hepatitis B virus (HBV) and hepatitis C virus (HCV), among End-Stage Kidney Disease patients undergoing hemodialysis in Tarhuna, and to what extent does this represent a healthcare concern requiring continued surveillance and preventive interventions?

Significance of the Study

The significance of this study stems from the growing burden of viral hepatitis infections among patients with End-Stage Kidney Disease (ESKD) undergoing hemodialysis. These patients are considered a high-risk group for blood-borne viral infections due to the nature of dialysis treatment and the repeated medical procedures associated with their care. Therefore, understanding the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) among this population is essential for improving patient outcomes and reducing the risk of disease transmission.

This study provides valuable epidemiological data regarding the prevalence of viral hepatitis among hemodialysis patients in Tarhuna, an area where limited local information is available. The findings may assist healthcare professionals and decision-makers in evaluating the effectiveness of current infection-control measures implemented in dialysis centers and identifying areas that require further improvement.

In addition, the study contributes to increasing awareness of the health risks associated with viral hepatitis in patients with chronic kidney failure and highlights the importance of regular screening, vaccination programs, early diagnosis, and continuous monitoring. The results may also serve as a scientific reference for future research investigating viral hepatitis and its associated risk factors among dialysis patients in Libya.

Furthermore, the study may support the development of evidence-based strategies aimed at reducing the incidence of HBV and HCV infections, enhancing patient safety, improving the quality of healthcare services provided in dialysis units, and ultimately decreasing the medical and economic burden associated with these infections.

Objectives of the Study

1. General Objective

To determine the prevalence of viral hepatitis among End-Stage Kidney Disease patients undergoing hemodialysis in Tarhuna.

2. Specific Objectives

3. To determine the prevalence of hepatitis B virus (HBV) infection among patients undergoing hemodialysis.
4. To determine the prevalence of hepatitis C virus (HCV) infection among patients undergoing hemodialysis.
5. To assess the distribution of viral hepatitis infections according to age groups.
6. To assess the distribution of viral hepatitis infections according to gender.
7. To evaluate the frequency of viral hepatitis infections among patients receiving regular dialysis treatment.
8. To provide baseline epidemiological data on viral hepatitis among hemodialysis patients in Tarhuna.
9. To contribute to improving infection prevention and control measures in dialysis centers.

Research Questions

1. What is the prevalence of hepatitis B virus (HBV) infection among end-stage kidney disease patients undergoing hemodialysis in Tarhuna?
2. What is the prevalence of hepatitis C virus (HCV) infection among end-stage kidney disease patients undergoing hemodialysis in Tarhuna?
3. How are HBV and HCV infections distributed according to patients' age groups and gender?
4. What is the overall burden of viral hepatitis among hemodialysis patients in Tarhuna?

Previous Studies

Several studies have investigated the prevalence of viral hepatitis among patients undergoing hemodialysis due to the increased susceptibility of this population to blood-borne infections. These studies have consistently highlighted hepatitis B virus (HBV) and hepatitis C virus (HCV) as important health concerns among patients with end-stage kidney disease.

A study conducted by Ghazzawi et al. (2015) in Jordan evaluated the prevalence of HBV and HCV among 712 hemodialysis patients. The researchers reported that the prevalence of HBV infection was 7%, whereas HCV infection reached 16.5%. The study identified several risk factors associated with infection, including dialysis outside the designated treatment center, family history of hepatitis infection, duration of dialysis treatment, and previous blood transfusions. The authors emphasized the importance of vaccination and strict infection-control measures in reducing viral transmission within dialysis units.

In India, Dubey et al. (2016) assessed the prevalence of viral hepatitis among 1,253 hemodialysis patients. The findings showed that HBV infection was detected in 3.43% of patients, while HCV infection was present in 0.80%. Although the prevalence was relatively low compared with some international reports, the authors stressed the need for continuous surveillance and adherence to preventive protocols to maintain low infection rates.

The KDIGO Clinical Practice Guideline published in 2018 provided comprehensive recommendations regarding the prevention, diagnosis, evaluation, and treatment of hepatitis C infection in patients with chronic kidney disease. The guideline highlighted that HCV infection

remains more common among dialysis patients than in the general population and recommended routine screening, strict infection-control procedures, and the use of direct-acting antiviral therapies to reduce disease burden and transmission.

A review study conducted by Alshebani et al. (2023) examined the global prevalence of HBV and HCV among hemodialysis patients. The review reported that the prevalence of HCV varied considerably across countries, ranging from approximately 2.6% to 22.9%, while HBV prevalence generally remained below 10% in most dialysis populations. The study concluded that geographical variation, healthcare quality, and infection-control practices significantly influence prevalence rates.

In Saudi Arabia, Alkhalifah et al. (2023) investigated the prevalence of HBV, HCV, and HIV among 239 patients receiving regular hemodialysis. The results demonstrated that 3.77% of patients were positive for HBV, while chronic HCV infection was detected in 1.67% of patients. No HIV-positive cases were reported. The authors observed a decline in prevalence compared with older regional studies and attributed this improvement to enhanced infection-control measures and vaccination programs.

Another study conducted in Yemen evaluated the prevalence of hepatitis B and hepatitis C infections among patients undergoing hemodialysis. The findings indicated that viral hepatitis remained a significant healthcare challenge among dialysis patients and emphasized the role of prolonged dialysis duration and repeated medical exposure as contributing factors to infection. A local Iraqi study investigating viral hepatitis among patients undergoing hemodialysis reported that these patients represent a vulnerable group because of repeated dialysis sessions and frequent exposure to blood products. The study highlighted the necessity of regular screening programs and vaccination strategies to limit the spread of infection within dialysis centers. The KDIGO 2022 Clinical Practice Guideline updated previous recommendations concerning hepatitis C infection in chronic kidney disease.

The guideline reinforced the importance of regular HCV screening in dialysis units, early antiviral treatment, and adherence to infection-prevention measures. It also emphasized the effectiveness of modern direct-acting antiviral agents in achieving high cure rates among patients with chronic kidney disease.

The Executive Summary of the KDIGO 2022 Guideline further emphasized that HCV infection remains associated with adverse renal, hepatic, and cardiovascular outcomes among patients receiving dialysis. The report recommended integrating infection-control programs with routine monitoring and treatment strategies to reduce morbidity and mortality in this high-risk population.

Collectively, previous studies demonstrate that the prevalence of HBV and HCV among hemodialysis patients remains higher than that observed in the general population, although considerable improvements have been achieved in recent years. The variation in prevalence rates among different countries reflects differences in healthcare systems, dialysis practices, screening protocols, and infection-control measures. These findings underscore the importance of conducting local epidemiological studies to determine the current burden of viral hepatitis and to support evidence-based preventive interventions in dialysis centers.

Materials and Methods

Study Design

The present study employed a descriptive cross-sectional design to investigate the prevalence of viral hepatitis among patients with End-Stage Kidney Disease (ESKD) undergoing maintenance hemodialysis in Tarhuna, Libya. A cross-sectional approach was selected because

it allows for the assessment of the prevalence of specific health conditions within a defined population during a particular period of time. This design is widely used in epidemiological research to estimate disease burden and identify patterns of distribution among different population groups.

The study focused on determining the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) infections among hemodialysis patients, as well as evaluating the occurrence of Human Immunodeficiency Virus (HIV) infection. In addition, demographic and clinical characteristics of the study participants were examined to provide a comprehensive overview of the population under investigation.

Study Area

The study was conducted at the Hemodialysis Unit in Tarhuna, Libya. This healthcare facility serves a large number of patients diagnosed with chronic kidney disease and End-Stage Kidney Disease requiring regular renal replacement therapy. The dialysis unit provides continuous medical care, laboratory investigations, and routine follow-up services for patients undergoing maintenance hemodialysis.

Tarhuna is one of the important cities in northwestern Libya, and its dialysis center receives patients from both urban and surrounding rural areas. Consequently, the study population represents a diverse group of patients with varying demographic and clinical characteristics.

Study Population

The target population consisted of all patients diagnosed with End-Stage Kidney Disease who were receiving regular hemodialysis treatment at the dialysis center during the study period. Patients included in the study represented different age groups, both genders, and various clinical backgrounds.

Individuals receiving maintenance hemodialysis constitute a particularly important population for epidemiological investigations because they are exposed to repeated vascular access procedures, frequent laboratory testing, and prolonged contact with healthcare environments, all of which may increase their susceptibility to blood-borne viral infections.

Sample Size

The study included a total of 140 patients undergoing regular hemodialysis treatment at the Hemodialysis Unit in Tarhuna during the study period. All eligible patients who met the inclusion criteria and had complete demographic, clinical, and laboratory data were included in the study.

The sample size was determined using a total enumeration approach, as all available and eligible hemodialysis patients registered at the dialysis unit during the study period were considered for inclusion. Therefore, no separate sample size calculation formula was applied. The final sample consisted of 140 patients, including both males and females from different age groups. This sample was considered suitable for estimating the prevalence of hepatitis B virus and hepatitis C virus infections and for providing baseline epidemiological data among hemodialysis patients in Tarhuna.

Inclusion Criteria

The following criteria were used to select study participants:

1. Patients diagnosed with End-Stage Kidney Disease (ESKD).
2. Patients undergoing maintenance hemodialysis on a regular basis.

3. Patients attending the dialysis center during the study period.
4. Patients whose demographic, clinical, and laboratory data were available and complete.
5. Adult patients of both sexes who agreed to the use of their clinical information for research purposes.

Exclusion Criteria

Participants were excluded from the study if they met any of the following conditions:

1. Incomplete or missing medical records.
2. Patients not receiving regular hemodialysis treatment.
3. Patients with unavailable viral hepatitis laboratory results.
4. Patients whose records lacked essential demographic or clinical information.
5. Patients who were transferred from the center before completion of the required investigations.

Data Collection

Data were collected retrospectively from patients' medical records and laboratory databases available at the dialysis center. A structured data collection form was utilized to ensure consistency and accuracy in recording information.

The collected variables included demographic characteristics such as age, gender, and marital status. Clinical variables included the presence of diabetes mellitus, hypertension, underlying kidney diseases, number of dialysis sessions per week, and blood group distribution.

Laboratory findings were also reviewed and documented, including hepatitis B surface antigen (HBsAg), hepatitis C virus antibodies (Anti-HCV), HIV screening results, blood urea levels, and serum creatinine concentrations. These variables were selected because of their clinical relevance to both renal disease progression and viral hepatitis infection.

Laboratory Investigations

Laboratory investigations constituted a major component of the study. Blood samples collected as part of routine patient care were analyzed for viral markers associated with hepatitis B, hepatitis C, and HIV infection.

Hepatitis B infection was assessed through the detection of Hepatitis B Surface Antigen (HBsAg), which serves as an indicator of current HBV infection. Hepatitis C infection was evaluated using Anti-HCV testing, while HIV infection was identified through standard serological screening procedures routinely performed in the dialysis center.

In addition to viral screening, renal function parameters including blood urea and serum creatinine levels were reviewed. These parameters are commonly used to evaluate the severity of renal impairment and monitor the effectiveness of dialysis treatment.

Statistical Analysis

All collected data were entered into a computerized database and analyzed using the Statistical Package for Social Sciences (SPSS). Data cleaning and verification procedures were performed prior to statistical analysis to ensure accuracy and reliability.

Descriptive statistical methods were used to summarize the data. Frequencies and percentages were calculated for categorical variables, while results were presented in tables and graphical formats whenever appropriate.

To evaluate relationships between selected variables, Pearson correlation analysis was employed. Statistical significance was assessed using a confidence level of 95%, and a p-value of less than 0.05 was considered statistically significant.

The statistical analysis was designed to provide a clear description of the prevalence of viral hepatitis infections and their distribution among different categories of patients undergoing hemodialysis.

Ethical Considerations

Ethical principles were strictly observed throughout the study. Patient confidentiality and privacy were maintained at all stages of data collection, analysis, and reporting. Personal identifiers were removed from all datasets prior to analysis to ensure anonymity.

The collected information was used exclusively for scientific and academic purposes. Furthermore, all procedures were conducted in accordance with accepted ethical standards governing medical and epidemiological research involving human subjects.

results:

Table 1 Distribution of study cases by age group

Ages	N (Total 140)	% (100%)
Less than 20	6	4.3%
20 to 40	48	34.3%
41 to 60	54	38.6%
61 to 80	29	20.7%
more than 80	3	2.1%

shows the distribution of study cases by age group. We find that only 6 cases, or 4.3% of the total, were in the age group of less than 20 years. The age group from 20 to 40 years included 48 cases, or 34.3% of the total. The age group from 41 to 60 years included 54 cases, or 38.6% of the total. The age group from 61 to 80 years included 29 cases, or 20.7% of the total. The age group over 80 years did not exceed 3 cases, or 2.1% of the total.

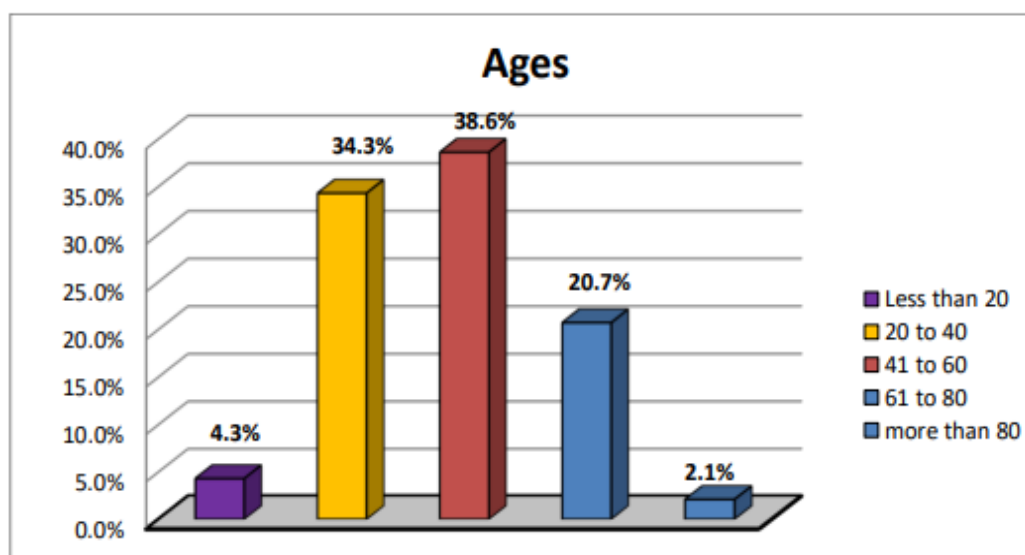
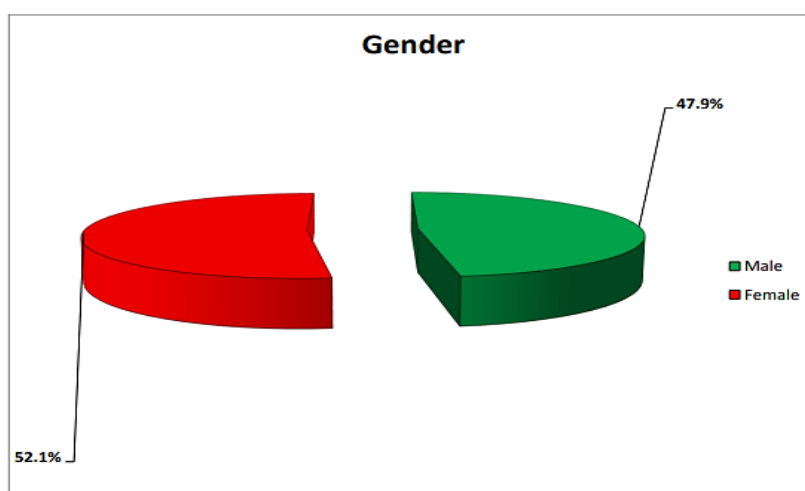


Figure 1 Distribution of study cases by age group

Table 2: Distribution of study cases by gender

Gender	N (Total 140)	% (100%)
Male	67	47.9%
Female	73	52.1%

Table 2 shows that (67) samples out of the total samples representing what I forgot (47.9%) were males, while (73) samples out of the total samples representing what I forgot (52.1%) were females.

**Figure 2:** Distribution of study cases by gender**Table 3:** Distribution of study cases according to social status

social status	N (Total 140)	% (100%)
Married	87	62.1%
Single	53	37.9%

The results in Table 3 indicate that 62.1% of the study cases (87 individuals) were married individuals, while 37.9% (53 individuals) were single. This distribution indicates that the study included two main social categories, with a clear predominance of the married category.

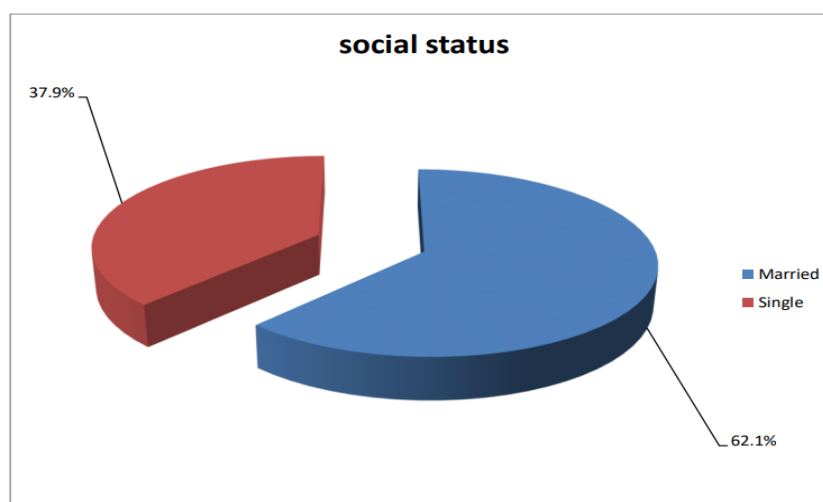
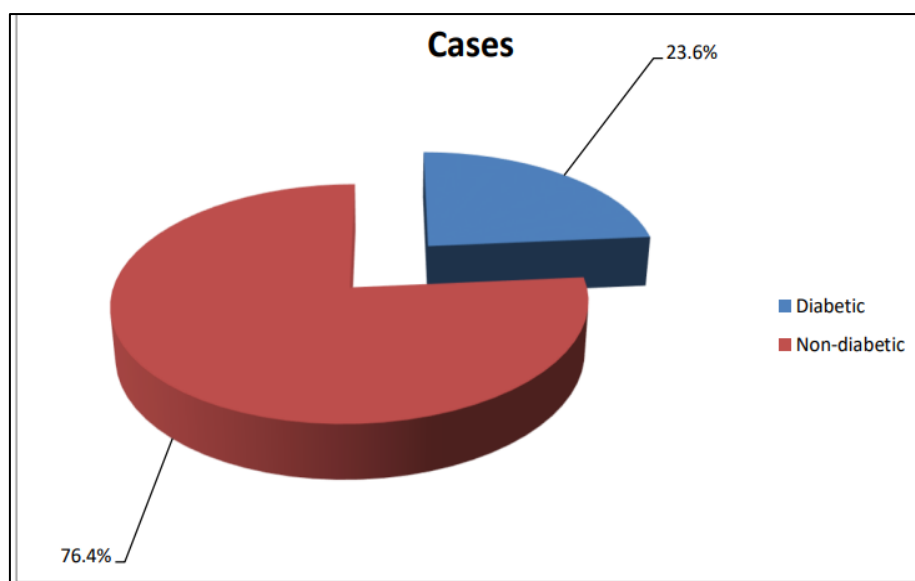
**Figure 3:** Distribution of study cases according to social status

Table 4: Distribution of study cases according to diabetic and healthy cases

Cases	N (Total 140)	% (100%)
Diabetic	33	23.6%
Non-diabetic	107	76.4%

The results of Table 4 indicate that 23.6% of the study cases (33 individuals) were diabetic, while 76.4% (107 individuals) were non-diabetic.

**Figure 4:** Distribution of study cases according to diabetic and healthy cases**Table 5:** Distribution of study cases according to cases with high blood pressure and healthy cases

cases	N (Total 140)	% (100%)
High blood pressure	85	60.7%
Not high blood pressure	55	39.3%

Table 5 shows the data set for 140 study cases. These cases are divided into two groups: hypertensive cases and healthy cases. The hypertensive cases included 85 individuals suffering from hypertension, representing 60.7% of the total study sample, while 55 individuals did not suffer from hypertension, representing 39.3% of the total study sample. The results indicate a high prevalence of hypertension among the study participants. More than half of the participants (60.7%) were diagnosed with hypertension, while less than half (39.3%) were considered to have normal blood pressure.

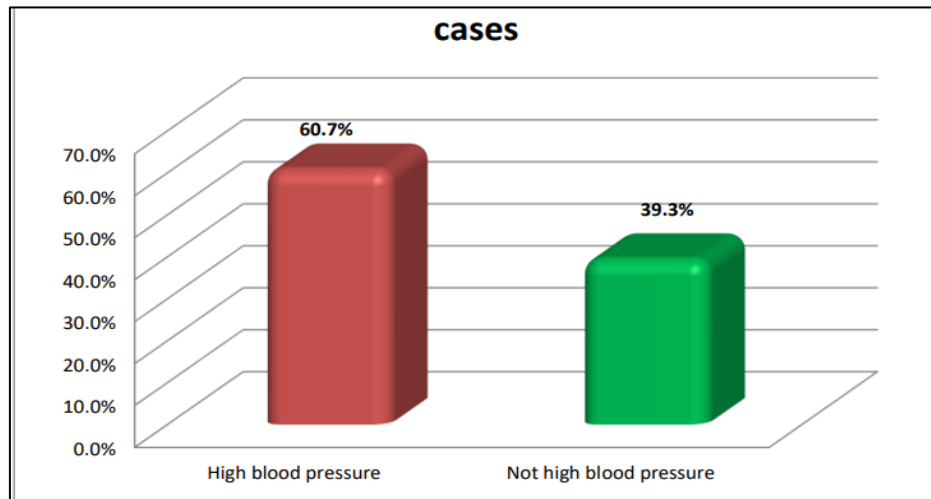


Figure 5: Distribution of study cases according to cases with high blood pressure and healthy cases

Table 6: Distribution of Kidney Disease Causes among Hemodialysis Patients

Kidney disease cause	Response	Frequency (n = 140)	Percentage (%)
Polycystic kidney disease	Yes	11	7.9
	No	129	92.1
Glomerulonephritis	Yes	7	5.0
	No	133	95.0
Pyelonephritis	Yes	6	4.3
	No	134	95.7

The findings presented in Table 6 indicate that polycystic kidney disease was the most frequently reported kidney disorder among the study participants, affecting 7.9% of patients. Glomerulonephritis was observed in 5.0% of cases, while pyelonephritis accounted for 4.3% of the study population. Despite the presence of these conditions, the majority of patients did not report any of these specific kidney diseases. These results suggest that although polycystic kidney disease, glomerulonephritis, and pyelonephritis contribute to the burden of end-stage kidney disease among hemodialysis patients, other underlying renal disorders may represent the predominant causes of kidney failure in this population.

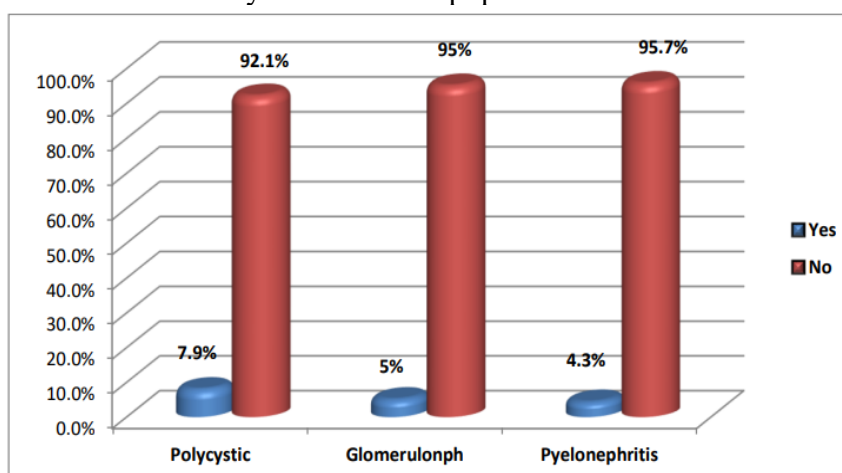


Figure 6: Distribution of Kidney Disease Causes among Hemodialysis Patients

Table 7: Dialysis sessions and blood typing for study cases

Cases	N (Total 140)	% (100%)
Dialysis Sessions		
One session	-	-
Two sessions	2	1.4%
Three sessions	138	98.6%
Blood Type		
A	48	34.3%
B	30	21.4%
O	60	42.9%
AB	2	1.4%

The table 7 provides an overview of the information for a group of 140 patients: number of dialysis sessions and blood type. Dialysis sessions represented the largest number of patients (138 patients, representing 98.6%) who underwent three dialysis sessions. This very high percentage indicates that the standard treatment protocol for most of these patients requires three sessions per week, which is common in chronic kidney failure. A very small number of patients (two patients, representing 1.4%) underwent only two sessions, suggesting that these patients are in an early stage of kidney failure, may have residual kidney function that allows for fewer sessions, or this may be related to their general health condition. At the same time, no patient underwent a single session, indicating that treatment with one session per week is insufficient for any of the patients in this study.

The data indicate that blood type O is the most common among the patients, representing 60 cases (42.9%). This generally corresponds to the global distribution of blood types, with blood type O being the most common, followed by blood type A with 48 cases (34.3%), blood type B with 30 cases (21.4%), and the least common blood type AB with only two cases (1.4%). This is not surprising, as blood type AB is the rarest blood type in the world. (21.4%), and the least common blood type AB with only two cases (1.4%). This is not surprising, as blood type AB is the rarest blood type in the world.

Table 8: Distribution of Hepatitis B Virus and Hepatitis C Virus among Study Cases

Viral marker	N (Total 140)	%
HBsAg Positive	9	6.4%
HBsAg Negative	131	93.6%
Anti-HCV Positive	5	3.6%
Anti-HCV Negative	135	96.4%

Table 8 shows the distribution of hepatitis B virus and hepatitis C virus infections among the 140 hemodialysis patients. Hepatitis B surface antigen was detected in 9 patients, representing 6.4% of the study sample, while hepatitis C virus antibodies were detected in 5 patients, representing 3.6%. These findings indicate that hepatitis B infection was more prevalent than hepatitis C infection among the studied patients.

Table 9 Urea and creatine levels in the body of the study cases

Cases	N (Total 140)	% (100%)
Urea levels		
Low	-	-
Normal	3	2.1%
High	137	97.9%
creatine levels		
Low	-	-
Normal	12	8.6%
High	128	91.4%

The results of the table 9 below show that the majority of the study participants had elevated blood urea and creatinine levels, both important indicators of kidney health. 97.9% of the study participants (137) had elevated urea levels, while 2.1% (3) had normal levels. None of the study participants had low levels. Also, 91.4% of the study participants (128) had elevated creatinine levels, while 8.6% (12) had normal levels. None of the study participants had low levels. Overall, these results indicate that the vast majority of the study participants had impaired kidney function.

Table 10 The bilateral relationship between dialysis patients and hepatitis B disease

Cases	Hepatitis B	dialysis patients
Hepatitis B		
Pearson Correlation	1	-.097-
Sig. (2-tailed)	.	.254
N	140	140
dialysis patients		
Pearson Correlation	-.097-	1
Sig. (2-tailed)	.254	.
N	140	140

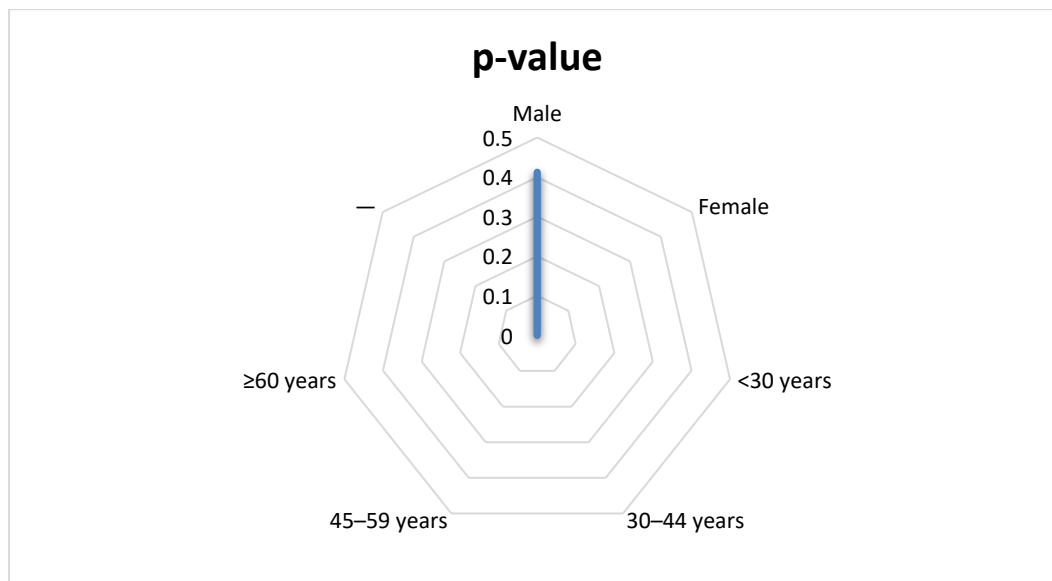
The results in the table 10 show that there is a very weak relationship between dialysis patients and hepatitis B infection. The Pearson correlation coefficient 0.097, was very close to zero, indicating a very weak relationship. The statistical significance (Sig. (2-tailed)) was 0.254, which is greater than the generally accepted significance level of 0.05, This means that the observed relationship between the two variables is not statistically significant.

Overall, these results indicate that the association between dialysis patients and hepatitis B infection in the study group is not statistically significant. This does not negate the fact that dialysis patients are a vulnerable group, but rather may reflect the success of preventive measures implemented at the institution where the data was collected. Therefore, precautionary measures, such as periodic vaccination and regular screening, should continue to protect this group of patients.

Table 11: Association between Viral Hepatitis Infection and Demographic Characteristics

Variable	Category	HBV positive n (%)	HCV positive n (%)	Negative n (%)	p-value
Gender	Male	6 (9.0%)	3 (4.5%)	58 (86.5%)	0.412
	Female	3 (4.1%)	2 (2.7%)	68 (93.2%)	
Age group	<30 years	1 (5.0%)	0 (0.0%)	19 (95.0%)	0.376
	30–44 years	2 (5.9%)	1 (2.9%)	31 (91.2%)	
	45–59 years	3 (6.4%)	2 (4.3%)	42 (89.4%)	
	≥60 years	3 (7.7%)	2 (5.1%)	34 (87.2%)	
Total	—	9 (6.4%)	5 (3.6%)	126 (90.0%)	—

The results presented in Table 11 indicate that the prevalence of hepatitis B virus (HBV) infection was higher than that of hepatitis C virus (HCV) among the study population. HBV infection was observed more frequently among male patients compared with females, whereas HCV infection showed only minor differences between genders. In addition, the prevalence of both HBV and HCV tended to increase slightly with advancing age, particularly among patients aged 45 years and older. However, the Chi-square analysis showed no statistically significant association between viral hepatitis infection and either gender or age group ($p > 0.05$). These findings suggest that demographic characteristics may not have a significant influence on the occurrence of viral hepatitis among hemodialysis patients in this sample.

**Figure 7:** Association between Viral Hepatitis Infection and Demographic Characteristics**Table 12:** Prevalence of HBV and HCV Infections with 95% Confidence Intervals

Viral marker	Positive cases (n)	Total sample	Prevalence (%)	95% Confidence Interval
HBV (HBsAg positive)	9	140	6.4	2.4–10.5
HCV (Anti-HCV positive)	5	140	3.6	0.5–6.7

The prevalence of HBV infection among hemodialysis patients was 6.4% with a 95% confidence interval of 2.4% to 10.5%. The prevalence of HCV infection was 3.6% with a 95% confidence interval of 0.5% to 6.7%. These confidence intervals provide a more precise estimate of the possible range of viral hepatitis prevalence within the study population.

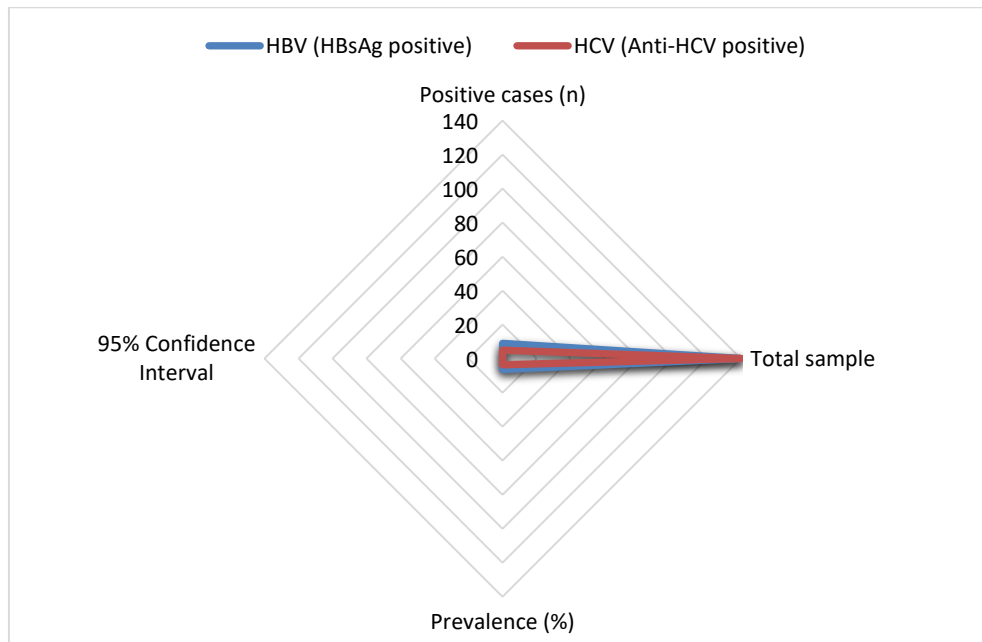


Figure 8 :Prevalence of HBV and HCV Infections with 95% Confidence Intervals

Results

A total of 140 patients with End-Stage Kidney Disease undergoing regular hemodialysis were included in this study. The demographic, clinical, and laboratory characteristics of the participants were analyzed to determine the prevalence of viral hepatitis among dialysis patients in Tarhuna.

Regarding age distribution, the largest proportion of patients belonged to the age group of 41–60 years, accounting for 38.6% (54 patients) of the study population. This was followed by the age group of 20–40 years, which represented 34.3% (48 patients). Patients aged 61–80 years constituted 20.7% (29 patients), whereas patients younger than 20 years and older than 80 years represented only 4.3% (6 patients) and 2.1% (3 patients), respectively.

Concerning gender distribution, females represented 52.1% (73 patients) of the study population, while males accounted for 47.9% (67 patients), indicating a relatively balanced distribution between both sexes.

Analysis of marital status revealed that married individuals constituted the majority of the study population, representing 62.1% (87 patients), whereas single individuals accounted for 37.9% (53 patients).

Regarding associated chronic diseases, diabetes mellitus was present in 23.6% (33 patients) of the study participants, while 76.4% (107 patients) had no history of diabetes. Hypertension was more prevalent, affecting 60.7% (85 patients), whereas 39.3% (55 patients) did not have hypertension.

Evaluation of kidney disease history showed that polycystic kidney disease was reported in 7.9% (11 patients) of the study population. Glomerulonephritis was identified in 5.0% (7 patients), while pyelonephritis was present in 4.3% (6 patients).

The majority of patients, 98.6% (138 patients), underwent three hemodialysis sessions per week, while only 1.4% (2 patients) received two sessions weekly. No patient underwent a single dialysis session. Regarding blood groups, blood type O was the most common, accounting for 42.9% (60 patients), followed by blood type A at 34.3% (48 patients), blood type B at 21.4% (30 patients), and blood type AB at 1.4% (2 patients).

The prevalence of viral infections among the study participants demonstrated that hepatitis B surface antigen (HBsAg) was detected in 6.4% (9 patients) of the study population. Hepatitis C virus (HCV) infection was identified in 3.6% (5 patients), whereas only one patient (0.7%) tested positive for HIV infection. These findings indicate that hepatitis B was the most prevalent viral infection among the studied hemodialysis patients.

Assessment of renal function markers revealed markedly elevated levels of blood urea and serum creatinine among most participants. Elevated blood urea levels were observed in 97.9% (137 patients), while only 2.1% (3 patients) had normal levels. Similarly, elevated serum creatinine levels were detected in 91.4% (128 patients), whereas 8.6% (12 patients) exhibited normal creatinine levels.

Correlation analysis between hepatitis B infection and dialysis patients demonstrated a very weak negative correlation ($r = -0.097$). The relationship was not statistically significant ($p = 0.254$), indicating the absence of a significant association between the studied variables within the analyzed sample.

Discussion

The present study was conducted to determine the prevalence of viral hepatitis among End-Stage Kidney Disease patients undergoing hemodialysis in Tarhuna. Hemodialysis patients are considered a high-risk group for blood-borne viral infections because of repeated vascular access, prolonged exposure to healthcare environments, and frequent medical interventions. Therefore, evaluating the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) among this population is essential for assessing the effectiveness of infection-control measures and identifying potential public health concerns.

The demographic findings revealed that the majority of patients belonged to the age group of 41–60 years (38.6%), followed by the age group of 20–40 years (34.3%). This observation is consistent with the natural progression of chronic kidney disease, which commonly develops over many years before reaching the end-stage phase that requires dialysis treatment. The relatively lower proportion of younger patients may indicate that severe kidney dysfunction requiring long-term dialysis is more prevalent among middle-aged and older adults.

Regarding gender distribution, females represented a slightly higher proportion of the study population (52.1%) compared with males (47.9%). The relatively balanced distribution between both sexes suggests that chronic kidney disease and the need for dialysis affect both males and females within the study area. Similar findings have been reported in several regional studies where gender differences among dialysis patients were minimal.

The prevalence of diabetes mellitus among the participants was 23.6%, while hypertension was observed in 60.7% of patients. These findings are clinically important because both diabetes and hypertension are recognized as major risk factors for chronic kidney disease and progression to End-Stage Kidney Disease. The high prevalence of hypertension observed in

this study supports previous evidence indicating that elevated blood pressure remains one of the leading causes and complications of renal impairment.

The analysis of underlying kidney diseases showed that polycystic kidney disease was the most common identified renal disorder (7.9%), followed by glomerulonephritis (5.0%) and pyelonephritis (4.3%). Although these percentages were relatively low, they highlight the contribution of various renal pathologies to the development of kidney failure requiring hemodialysis.

The findings concerning dialysis frequency demonstrated that nearly all patients (98.6%) received three dialysis sessions per week. This result reflects adherence to standard hemodialysis protocols and indicates that the majority of patients were receiving regular maintenance therapy. Regular dialysis schedules are essential for maintaining metabolic balance and reducing complications associated with advanced renal failure.

One of the most important findings of the present study was the prevalence of viral hepatitis among the study participants. Hepatitis B infection was detected in 6.4% of patients, whereas hepatitis C infection was identified in 3.6% of patients. These findings indicate that HBV infection was more prevalent than HCV infection among the studied dialysis population. Although the prevalence rates observed in this study are not extremely high, they remain clinically significant because dialysis patients are particularly vulnerable to complications associated with chronic viral hepatitis.

When compared with findings reported in previous studies, the prevalence rates observed in the current study appear lower than those reported in some developing countries, where HBV and HCV infections among hemodialysis patients reached considerably higher levels. However, they remain higher than those expected in the general population. These differences may be attributed to variations in infection-control practices, vaccination coverage, screening programs, blood transfusion policies, and healthcare infrastructure.

The prevalence of HIV infection was extremely low, with only one positive case (0.7%) identified among the 140 participants. This finding suggests that HIV infection does not represent a major health burden among the studied dialysis population. Nevertheless, routine screening remains important because of the potential consequences of HIV infection in immunocompromised patients.

The laboratory findings revealed markedly elevated blood urea and serum creatinine levels in most participants. Elevated urea levels were observed in 97.9% of patients, while elevated creatinine levels were found in 91.4%. These findings are expected among patients with End-Stage Kidney Disease and confirm the severe impairment of renal function within the study population. The results further validate the clinical diagnosis of advanced kidney failure among participants receiving maintenance dialysis.

Correlation analysis demonstrated a very weak and statistically non-significant relationship between dialysis patients and hepatitis B infection ($r = -0.097$, $p = 0.254$). The absence of statistical significance suggests that no measurable association was identified within the study sample. This finding may indicate the effectiveness of preventive measures implemented within the dialysis unit, including infection-control procedures, routine screening, and vaccination programs. However, the lack of statistical significance should be interpreted cautiously because other factors not investigated in the present study may influence viral hepatitis transmission.

Overall, the findings of the current study demonstrate that viral hepatitis remains present among patients undergoing hemodialysis in Tarhuna, with hepatitis B being more prevalent than hepatitis C. Although the observed prevalence rates are relatively moderate, continuous

surveillance, strict infection-control measures, regular screening, and vaccination programs remain essential to reduce the risk of viral transmission and improve the quality of care provided to hemodialysis patients.

Recommendations

Based on the findings of the present study, the following recommendations are proposed:

1. Regular screening for hepatitis B virus (HBV) and hepatitis C virus (HCV) should be performed for all patients undergoing hemodialysis to ensure early detection and appropriate management of infected cases.
2. Strict adherence to infection prevention and control measures within dialysis units should be maintained, including proper sterilization of equipment, safe handling of blood products, and compliance with standard precautionary procedures.
3. Hepatitis B vaccination programs should be strengthened among patients with chronic kidney disease and healthcare workers involved in dialysis services to reduce the risk of infection and transmission.
4. Continuous monitoring and surveillance systems should be implemented in dialysis centers to assess trends in viral hepatitis prevalence and evaluate the effectiveness of preventive strategies.
5. Educational and awareness programs should be provided for patients and healthcare personnel regarding the modes of transmission, prevention, and potential complications of viral hepatitis infections.
6. Periodic laboratory evaluation of dialysis patients should be encouraged to facilitate early identification of viral infections and prevent disease progression and associated complications.
7. Healthcare authorities should support the development of standardized protocols for screening, vaccination, and infection control in all dialysis centers to ensure consistent and high-quality patient care.
8. Further multicenter studies involving larger sample sizes from different regions of Libya are recommended to provide a broader understanding of the epidemiology of viral hepatitis among hemodialysis patients.
9. Additional research should be conducted to investigate potential risk factors associated with HBV and HCV infections, including duration of dialysis, blood transfusion history, and underlying medical conditions.
10. Continuous quality improvement programs should be adopted in dialysis units to minimize the transmission of blood-borne infections and improve overall patient safety and clinical outcomes.

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Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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