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# Prevalence of Hepatitis B Virus and Hepatitis C Virus Infection among Hemodialysis Patients in Taiz City-Yemen

**Abdulgleel Abdulghani Al-shamiri**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen
Franch laboratory, The republican General Teching Hospital. Taiz, Yemen

**Adam Hezam Faed AL-Shammeri**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen
Department of Medical Laboratories
Al-Saeed University, Yemen

**Ashwaq Ahammed Abdullah**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen
alalawiashwaq1@yahoo.com
ashwaq.alawi@taiz.edu.ye
ORCID: 0000-0001-9485-0046

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# مدى انتشار فيروس الكبد البائي وفيروس الكبد سي ضمن الاشخاص الخاضعين للغسيل الكلوي في محافظة تعز

**الباحث/ عبدالجليل عبدالغني الشميري**
قسم الميكروبيولوجي- كلية العلوم التطبيقية - جامعة تعز
المختبر الفرنسي المستشفى العام التعليمي- تعز- اليمن

**د/ آدام حزام فائد الشميري**
قسم الميكروبيولوجي- كلية العلوم التطبيقية - جامعة تعز
قسم المختبرات الطبية جامعة السعيد- تعز- اليمن

**د/ أشواق أحمد عبدالله**
قسم الميكروبيولوجي- كلية العلوم التطبيقية - جامعة تعز

## الملخص

يتعرض مرضى غسيل الكلى HD لخطر الإصابة بالفيروسات المنقولة بالدم مثل فيروسات التهاب الكبد B وC (HBV وHCV). قد تؤدي العدوى المزمنة بفيروس التهاب الكبد B وC إلى تليف الكبد والفشل الكبدي وسرطان الخلايا الكبدية. هدفت هذه الدراسة إلى التحقيق في انتشار عدوى التهاب الكبد HBV وHCV بين مرضى HD في المستشفى الجمهوري العام التعليمي، مدينة تعز، اليمن. تم اخذ 511 مريضًا لـ HD من مايو 2019 إلى أبريل 2020. وفقًا للمعايير في قسم HD، كان على جميع المرضى فحص مستضد التهاب الكبد B السطحي (HBsAg) والأجسام المضادة لـ (HCV-Ab) عن طريق تقنيات المقايسة المناعية المرتبط بالإنزيم (ELISA). من بين 511 مريضاً، كان هناك 313 من الذكور (61.25%)، و198 من الإناث (38.74%).

تم العثور على معدل انتشار العدوى بفيروس التهاب الكبد B وC بنسبة 10.2% و13.11% على التوالي. تم العثور على انتشار عدوى فيروس التهاب الكبد B وC بين الذكور بنسبة 29.51% و70.49% على التوالي. وجد أن معدل انتشار العدوى بفيروس التهاب الكبد B وC بين الإناث بلغ 58.52% و41.38% على التوالي. كان مرضى HD معرضين بشكل كبير لخطر الإصابة بعدوى HBV و(P < 0.05) HCV. خلصت هذه الدراسة إلى أن الإصابة بفيروس التهاب الكبد B وC تمثل مشكلة صحية خطيرة في المستشفيات في وحدات غسيل الكلى في اليمن. لذلك، فإن الالتزام الصارم بمكافحة العدوى بين مرضى HD سيقلل من عدوى التهاب الكبد.

**الكلمات المفتاحية:** فيروس الكبد البائي، فيروس الكبد سي، الغسيل الكلوي.

# Prevalence of Hepatitis B Virus and Hepatitis C Virus Infection among Hemodialysis Patients in Taiz City-Yemen

**Abdulgleel Abdulghani Al-shamiri**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen.
Franch laboratory, The republican General Teching Hospital. Taiz, Yemen.

**Adam Hezam Faed AL-Shammeri**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen.
Department of Medical Laboratories, Al-Saeed University, Yemen.

**Ashwaq Ahammed Abdullah**
Department of Microbiology, Faculty of Applied Sciences, Taiz University, Yemen.

## Abstract:

Hemodialysis (HD) patients are at high risk of infection with blood-borne viruses such as hepatitis B and C viruses (HBV and HCV). Chronic infections with HBV and HCV may lead to liver cirrhosis, hepatic failure, and hepatocellular carcinoma. This study aimed to investigate the prevalence of HBV and HCV infections among HD patients at the Republican General Teaching Hospital, Taiz city, Yemen. A total of 511 patients underwent HD from May 2019 to April 2020. As standard at HD department, all patients had to screen for hepatitis B surface antigen (HBsAg) and HCV antibodies (HCV-Ab) by enzyme-linked immunosorbent assay (ELISA) techniques. Among 511 patients, 313 were males (61.25%) and, 198 were females (38.74%). The overall prevalence of HBV and HCV infections was found as 10.2% and13.11% respectively. The prevalence of HBV and HCV infections among males was found as 29.51% and 70.49% respectively. The prevalence of HBV and HCV infections among females was found as 58.52% and 41.38% respectively. HD patients were significantly at high risk of HBV and HCV infections ($P < 0.05$). This study concluded that HBV and HCV infection represents a serious nosocomial health problem in dialysis units in Yemen. So, strict adherence to infection control among HD patients will minimize hepatitis infections.

**Keywords**: Hepatitis B, Hepatitis C, Hemodialysis.

## Introduction

Hepatitis B virus (HBV) and hepatitis C virus (HCV) are the most common viral causes of hepatic diseases universally [1]. HBV causes hepatitis of altering severity up to 95% of children and 10% of adult patients [2].. Globally, 240 million and 180 million individuals were infected with HBV and, HCV respectively with 3-4 million people are infected every year ([3], [4]).

Generally, the route of transmission include are transmitted blood transfusions, sexual contact, and vertical transmission [5]. Viral hepatitis has a special relationship to renal disease [6]. Both viruses have a high among renal failure patients compared to their prevalence in the general population with high morbidity and mortality rates among renal failure patients or after renal transplantation [7].

Their prevalence among renal failure patients depended on their exposure to medical procedures or blood transfusion in end-stage kidney diseases and to the multiple invasive medical procedures to which these patients are exposed [8].

Recently, viral hepatitis infections are the most common nosocomial infection among HD patients due to the complications in the management of patients in the dialysis units. HBV and HCV infections have a wide range in prevalence rates in different regions of the world, ranging from 1% in the UK to more than 90% in Eastern Europe in hemodialysis patients [9].

In Arab countries, the prevalence of HBV infection positivity among HD patients ranged from 2% in Morocco to 11.8% in Bahrain [7].

In Yemen, HBV and HCV prevalences were reported. HBV was detected in 31%, 48.83%, 20.7% and, 3% HD patients in Aden, Zabeed, Sana’a and, Ibb respectively ([5], [7], [10],[11] ). On the other hand, HCV prevalences were 62.7%, 46.01%, 47.2% and, 21% in Aden, Zabeed, Sana’a and, Ibb respectively ([5], [7], [10], [11]).

This study aims to determine the prevalence of HBV and HCV among HD patients in Taiz city, Yemen.

## Material and methods:

### Study Design:

Samples were collected from HD patients centers. Informed agreement have been taken from the patients.

### Data:

Data were collected from patients underwent HD in the Republican General Teaching Hospital in Taiz from May 2019 to April 2020.

### Sample Collection

Random samples were collected from HD patients. Five milliliters of blood was drawn from each patient in plain tube, prior to dialysis and are tested for HBsAg and HCV antibodies (HCV-Ab) by using ELISA, (enzyme linked immunosorbent assay)

### Results and Discussion:

A total of 511 patients were undergo HD, almost 313 were males (61.25%) and 198 were females (38.74%). This study showed that HBV and HCV prevalence's among HD males were 29.51% and, 70.49% respectively. On the other hand, HBV and HCV prevalence's among HD females were 58.52% and, 41.38% respectively (Table 1).

**Table 1. Gender distribution of HBV and HCV seropositive among all hemodialysis patients**

| Gender | Patients tested | | non-infected patients | | infected patients | | Number of infected patients with hepatitis virus | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | HBV positive | | HCV positive | |
| | N | % | N | % | N | % | N | % | N | % |
| Male | 313 | 61.25 | 252 | 80.51 | 61 | 19.49 | 18 | 29.51 | 43 | 70.49 |
| Female | 198 | 38.74 | 140 | 70.71 | 58 | 29.29 | 34 | 58.52 | 24 | 41.38 |
| Total | 511 | 100 | 392 | 76.71 | 119 | 23.29 | 52 | 43.60 | 67 | 56.30 |

**Table 2. The overall prevalence's of HBV and HCV among HD patients in Taiz city.**

| Serological results | HBVsAg | | HCV antibodies | |
|---|---|---|---|---|
| | No. | % | No. | % |
| Seropositive | 52 | 10.2 | 67 | 13.11 |
| Seronegative | 459 | 89.8 | 444 | 86.89 |
| Total | 511 | 100 | 511 | 100 |

Results showed the overall prevalence's of HBV and HCV were 10.2% and 13.11% respectively among HD patients, as listed in table 2.

This study results showed that patients at HD units are at high risk of HBV and HCV infections (Table 3).

**Table 3. Chi-Square of HBV and HCV infections among HD patients.**

| Test Statistics | | | |
|---|---|---|---|
| | **Gender** | **Prevalence of HBsAg** | **Prevalence of HCVAb** |
| **Chi-Square** | **25.881a** | **327.360a** | **278.139a** |
| **df** | **1** | **1** | **1** |
| **Asymp. Sig.** | **.000** | **.000** | **.000** |

It has been reported that HD process increases the possibility of blood-borne viral infections. Viral infection prevalence's were different among different centers, regions and countries depending to HD services on them [12]. Viral hepatitis infection remains a serious health problem in HD centers [13].

HBV and HCV infections are considered global health problems, particularly among HD patients [14]. In this study, HBV and HCV prevalence's among HD patients were 10.2% and, 13.1% respectively.

HCV is the major viral hepatitis problem among HD patients [13]. There is a decline in HBV infection due to introducing of HBV vaccine and screening of transfused blood for HBV [15]. These results are lower than the HBV and HCV prevalence's in many studies among HD patients in nearby cities of Yemen. HBsAg and HCV antibodies prevalence were 31% and 62.7% in Aden [10], 48.83% and 46.01% in Zabeed [7], 20.7% and 47.2% in Sana'a [11] and 3% and 21% in Ibb [5]. Other studies revealed that 40.2% and 22.5% of HD patients in Aden and Sana'a were seropositive, respectively [16].

On the other hand, other Studies carried out in various worldwide centers among HD patients have shown that HCV prevalence were 8% - 36% in North America [17], 25% - 39% in South America [18], 1% - 36% in Europe [19], 17% - 51% in Asia [20], 1.2% - 10% in New Zealand and Australia [20] and 7% - 85% in South Africa [8]. Otherwise, one study showed that HCV prevalence was 5.9% among HD patients while, HBV prevalence was 1.4% and, prevalence of both viruses were 3.7%.

Increasing of infection cases for both viruses among patients in HD units due to lack of preventing measurement adherent during the dialysis process **(**[21], [22])**,** the length and frequency of HD and shared dialysis machine between HD patients [23]**.** This study was concluded that HBV prevalence was higher among females (58.52%) than that of males (29.51%). Otherwise, HCV prevalence was higher among males (70.49%) than that of females (41.38%).

Almezgagi and his group showed that HBV prevalence was high among males (5.4%) with no infection among females. In comparison, HCV prevalence was higher among females (29.54%) than that of males (14.28%) [5]**.** Al-Hegami and his colleagues showed that HBV infection is higher among males (55.41%) than that of females (30.36%), whereas HCV infection is higher among females (62.50%) than that of males (40.13%) [7]. *Bin Selm* observed that the highest rate of HCV was 39.2% among males [10].

Similarly**,** Baghza found that 60% of infected patients with HCV were males [16]**.** The difference in results between this study and other studies may be referred to as methods of specimen collection, processing, and type of techniques used for examination, control practices are inadequate (e.g**.** diagnostic and therapeutic procedures), multiple blood transfusion, such as patients with thalassaemia or haemophilia,, person underwent cosmetic procedures (such as tattooing and body piercing) ([24], [25]). drug addiction people, history of blood transfusion, and longer time under HD with contaminated equipment, are at high risk of nosocomial transmission in the unit [26].

In this study, the high prevalence of hepatitis viruses are associated with poor infection control practices in HD centers. Staffs training and best practices are necessary to minimize infection with hepatitis viruses in HD centers. Adequate screening tests for blood donors minimize HCV infection, since blood transfusion were recognized as the leading source of HCV infection ([27], [28]). On the other hand, the lack of association between blood transfusions and new infections suggests that fewer infections are acquired by this route than previously.

## Conclusion:

This study showed that HBV and HCV prevalence's were high among HD patients in Yemen. HBV and HCV infections remained as serious community health problems. Therefore, strict adherence to effective control procedures among HD patients will reduce, prevent and, control the incidence of viral hepatitis infections.

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## References:

[1] Xing D, Hongxi G, Zhao-Hua Z, Xu Z, Huy T, Yohko I et al. Molecular epidemiology of Hepatitis viruses and genotypic distribution of Hepatitis B and C viruses in Harbin, China. Jpn J Infect Dis. 2013;56:19–22.

[2] Muhammad MA, Sohail ZZ, Salman AM, Shahzad S, Asif NSS, Mehar AJA. Molecular epidemiology of Hepatitis B virus genotypes in Pakistan. BMC Infect Dis. 2007;7:115.

[3] Irfan M, Anwer Z, Naveed M, Ayub H, Amman M. HCV genotypes and risk factors; Current Scenario in Pakistan. PSM Biol Res. 2016;01(S1):S1-S5.

[4] World Health Organization. Hepatitis B fact sheet updated July 2016. World Health Organization. 2016. http://www.who.int/mediacentre/factsheets/fs204/en/. Accessed July 2016.

[5] Almezgagi MM, Edrees WH, Al-Shehari WA, Al-Moyed K, Al-Khwlany RS, Abbas AB. Prevalence of hepatitis B virus and hepatitis C virus and associated risk factors among hemodialysis patients in Ibb city-Yemen. possible submissions Microbiology. 2020;5(2):32-40.

[6] Zacks SL, Fried MWJIdcoNA. Hepatitis B and C and renal failure. 2001;15(3):877-99.

[7] Al-Hegami MA, Al-Mamari A, Al-Kadasse AS, Al-Gasha'a FA, Al-Hag S, Al-Hegami AA. Prevalence and risk factors of hepatitis B and hepatitis C virus infections among patients with chronic renal failure in Zabeed city, Yemen Republic. Journal of Medical Microbiology. 2015;5(03):136.

[8] Boulaajaj K, Elomari Y, Elmaliki B, Madkouri B, Zaid D, Benchemsi N. Prevalence of hepatitis C, hepatitis B and HIV infection among haemodialysis patients in Ibn-Rochd university hospital, Casablanca. Nephrologie therapeutique. 2005;1(5):274-84.

[9] Reddy GA, Dakshinamurthy KV, Neelaprasad P, Gangadhar T, Lakshmi V. Prevalence of HBV and HCV Dual Infection in Patients on Haemodialysis. Indian Journal of Medical Microbiology. 2005;23:41-3.

[10] Selm SB. Prevalence of hepatitis C virus infection among hemodialysis patients in a single center in Yemen. Saudi Journal of Kidney Diseases Transplantation. 2010;21`(6):1165.

[11] Al-Haj N, Al-Shaebi F, Al-Quradhi A, AlShamahy S, Al-Moyed K, Al-Areeqi A. Prevalence and risk factors of hepatitis C virus infection among Yemeni hemodialysis patients. public international journal research 2018;7(4):121-4.

[12] El-kader Y, El-Ottol A, Elmanama AA, Ayesh BM. Prevalence and Risk Factors of Hepatitis B and C Viruses among Hemodialysis Patients in Gaza Strip, Palestine. Virology Journal. 2010;7:210.

[13] Feher T. Ambuhi PM: chronic hepatitis virus infections in patients on renal replacement therapy. Nephrol Transplant. 2004;19(15):1049-53

[14] Edey M, Barraclough K, Johnson DWJN. Hepatitis B and dialysis. 2010;15(2):137-45.

[15] El-Otool AK, Elmanama AA, Ayesh BM. Prevalence and risk factors of hepatitis B and C viruses among hemodyalis patients in gaza strip, Palastine. Journal of Viro. 2010;7:210.

[16] Baghza MN. The prevalence of hepatitis C virus among hemodialysis patients in yemen. J. Purity Utility Reac. Environ. 2014;3(4):221-5.

[17] Zahedi MJ, Moghaddam SD, Alavian SM, Dalili M. Seroprevalence of Hepatitis Viruses B, C, D and HIV Infection among Hemodialysis Patients in Kerman Province, South-East Iran. Hepatitis Monthly. 2012;12:339-43.

[18] Santos MG, Danguilan RA, Que ET, Balmaceda RP, Padilla BS. Prevalence of Hepatitis B and Hepatitis C in Hemodialysis Patients. Nephrology. 1998;4:101-4.

[19] Wang C, Sun J, Zhu B. Hepatitis B Virus Infection and Related Factors in Hemodialysis Patients in China-Systemic Review and Meta-Analysis. Renal Failure. 2010;32:1255-64.

[20] Dentico P, Buongiorno R, Volpe A, Carlone A, Carbone M, Manno C et al. Prevalence and incidence of hepatitis C virus (HCV) in hemodialysis patients: study of risk factors. Clinical nephrology. 1992;38(1):49-52.

[21] Naman RE, Mansour I, Klayme S, Khalil G. Hepatitis C virus in hemodialysis patients and blood donors in Lebanon. J. Med. Liban. 1996;44:4 -9.

[22] Sinjari YH, Bakr AK. Prevalence and risk factors of hepatitis B and C virus infections among patients undergoing hemodialysis in Kurdistan, Iraq. Hepat Mon. 2018;18(5):e1177.

[23] Fabrizio F. Hepatitis C. Virus infection and dyalisis: 2012 update. Hindawine pub corporation. 2013;11:43-9.

[24] Omar N, Salama K, Adolf S, El-Saeed GS, Abdel GN, Ezzat N. Major risk of blood transfusion in hemolytic anemia patients. Blood Coagul Fibrinolysis. 2011;22(4):280.

[25] Olmer M, Bouchouareb D, Zandotti C, de Micco P, X. dL. Transmission of the hepatitis C virus in an hemodialysis unit: evidence for nosocomial infection. Clin Nephrol. 1997;47(4):263–70.

[26] Olmer M, Bouchouareb D, Zandotti C, De Micco P, De Lamballerie XJCn. Transmission of the hepatitis C virus in an hemodialysis unit: evidence for nosocomial infection. 1997;47(4):263-70.

[27] Taal MW, van Zyl-Smit R. Hepatitis C Virus Infection in Chronic Hemodialysis Patients-Relationship to Blood Transfusions and Dialyzer Re-Use. South African Medical Journal. 2000;S 90:621-5.

[28] Almawi WY, Qadi AA, Tamim H, Ameen G, Bu-Ali A, Arrayid S et al. Seroprevalence of Hepatitis C Virus and Hepatitis B Virus among Dialysis Patients in Bahrain and Saudi Arabia. Transplantation Proceedings. 2004;36:1824-6.