Original article

Prevalence of Hepatitis B Surface Antigen and Anti-HIV Antibodies among Patients on Maintenance Haemodialysis in Douala - Cameroon

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Abstract

PURPOSE / AIM

Compared to the general population, Hemodialysis (HD) patients have been shown to be at higher risk of blood borne viral infections among which include Hepatitis B virus (HBV) and Human immune deficiency virus (HIV).
With increasing access to HD in Cameroon, we opted to assess the prevalence of these viral infections among chronic HD patients of the Douala General Hospital dialysis center.

METHODS

From October to December 2012, all consenting patients of this center were screened for hepatitis B surface antigen (HBsAg) and anti-HIV antibodies. HBsAg was determined using a commercial third generation assay (BIOREX®). Anti HIV was first determined using a rapid HIV 1 and 2 Ag/Ab Combo test and confirmed using *ImmunoComb*® II *HIV* 1 & 2 BiSpot.

RESULTS

A total of 166 patients were studied of whom 63.9% were men. Mean age was 49.2 ± 14.2 years and median duration in dialysis was 24months [(Interquartile range (QR):8 – 42]. Hypertension was the main aetiology of end stage renal disease (ESRD) in 25.9% of patients. In the study population, 18.7% of patients had markers of at least one viral infection; HBsAg 7.8% and HIV 10.8% with only one patient (0.6%) being co-infected. Longer duration in dialysis was associated with lower prevalence of both infections, odd ratio (OR) 0.2 (95%CI 0.03 – 0.8, $p<0.01$) for HBsAg and 0.3 (95%CI 0.1 – 1.0, $p<0.05$) for HIV. No association was found with a history of STI, scarification and previous transfusions.

CONCLUSION

HBV and HIV infections are common among dialysis patients in Douala thereby warranting strict adherence to infection control measures.

KEY WORDS:

Hepatitis B, HIV, end stage renal disease, hemodialysis

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Résumé :

OBJECTIFS

Il a été démontré que par rapport à la population générale, les patients hémodialysés ont un risque plus élevé d'infections à transmission par voie sanguine, parmi lesquelles le virus de l'hépatite B (VHB) et le VIH. Vu l'amélioration de l'accès à l'hémodialyse (HD) au Cameroun, nous nous sommes proposés d'évaluer la prévalence de ces infections virales chez les patient hémodialysés chronique à l'hôpital général de Douala.

MÉTHODES

D'octobre à décembre 2012, tous les patients consentant et hémodialysés dans ce centre ont été dépisté pour l'antigène de surface du VHB (HBsAg) par un test de troisième génération (BIOREX®) et pour les anticorps anti-VIH initialement un test rapide HIV 1 et 2 Ag/Ab Combo puis confirmation avec ImmunoComb® II HIV 1 & 2 Bispot a été utilisé.

RÉSULTATS

Au total, 166 patients ont été inclus dont 63.9% d'hommes. L'âge moyen était de 49.2 ± 14.2 ans, durée médiane en dialyse 24mois (intervalle: 8 – 42). L'hypertension artérielle était la cause majeure de l'insuffisance rénale chronique terminale (25.9% des patients). 18.7% avait des marqueurs d'au moins une des infections virales étudiée: 7.8% étaient positif pour l'HBsAg, 10.8% pour le VIH et un patient (0.6%) était co-infectée. Une durée longue en dialyse était associée à une prévalence basse des deux infections virales. Aucune association n'a été retrouvée avec les antécédents de transfusion sanguine, d'infections sexuellement transmissibles et de scarification.

CONCLUSION

La prévalence de HBsAg et anti-VIH est élevée chez les patients hémodialysés à Douala nécessitant la mise en place de mesures strictes de contrôle d'infection.

MOTS CLÉS:

Hépatite B, VIH, Maladie rénale chronique, hémodialyse

INTRODUCTION

Maintenance HD is the most frequent mode of renal replacement therapy in end stage renal disease (ESRD) worldwide. Though this treatment increases the quality of life of these patients, it predisposes them to infections, especially blood borne infections, among which hepatitis B and C virus infections and human immune deficiency virus (HIV). In the haemodialysis unit, Hepatitis B Virus (HBV) has been identified as a prominent blood borne infection [1] with significant morbidity and mortality among these patients [2]. It has also been shown that maintenance haemodialysis (HD) patients are at higher risks of acquiring this infection and have a higher prevalence of HBV than in the general population [3, 4]. Globally, on the one hand, HBV infection represents a major public health problem with over 350 million chronically infected people [5] and on the other hand, the HIV pandemic with about 33.4 million infected persons worldwide [6] is another potential threat to HD patients. The rate of serum HBV surface antigen (HBsAg) seropositivity in maintenance HD in high income settings is comparatively lower (≤10%) than that in HD units in low income settings which is as high as 20% as reported in several reports [2, 3, 7]. Focusing on the prevalence of viral hepatitis and HIV in HD centers as well as identification of their associated risk factors could help health planners to effectively institute measures aimed at reducing disease burden. However, in sub Saharan Africa with the highest burden of these two viral infections [6, 8, 9], non-adherence to universal infection control procedures is common [10]. Cameroon in central Africa is endemic for these two viral infections with a prevalence in the general population varying from 8 - 12% [11, 12] for HBV and 5.3% [6] for HIV with significant regional discrepancies. In Cameroon, where there has been improved access to maintenance hemodialysis in recent years through government subsidies [13], with an associated decrease in mortality due to ESRD, little is known on the burden of blood borne viral infections in these patients. Therefore this cross-sectional study was aimed at assessing the prevalence of HBsAg, HIV antibodies, HBsAg-HIV co-infections and the potential risk factors of acquiring these infections among patients on haemodialysis in one of the major HD centers in Cameroon.

METHODS

A. Study setting

This cross sectional study was carried out at the hemodialysis center of the Douala General Hospital (DGH), the main reference hospital in Douala, the economic capital of Cameroon. The DGH is one of the most specialized tertiary institutions in Cameroon and harbours the largest government funded dialysis units in the country with the largest pool of ESRD patients in the country. It is equipped with 17HD Fresenius® 4008S generators (Fresenius Medical Care, Homburg, Germany), uses polysulfone dialysis membranes and bicarbonate dialysate. This center operates from Monday to Saturday and offers two hemodialysis sessions of 4 hours each per registered patient per week. In this center, there is no dialyzer reuse and isolation of seropositive patients is not common practice. The study was approved by the ethical committees of the Faculty of Medicine and pharmaceutical sciences of the Douala University Cameroon and the Douala General Hospital. All study participants gave a written informed consent to participate in the study.

B. Study methods and participants

From October to December 2012, all consenting HD patients undergoing dialysis in this centre were included in the study. Baseline socio-demographic information including age, sex, marital status, profession, history of scarifications which were relevant to the study were recorded in a case reporting form. Clinical data including the duration in dialysis, etiology of ESRD, number of pints of blood transfusion received, history of surgery, sexually transmitted infections (STI), were also recorded. Through peripheral venipuncture, 5ml of blood was drawn from each patient into a dry tube for serological testing. A third generation enzyme linked immunosorbent assay was used to detect HBsAg (BIOREX® Diagnostics ltd, Muckamore, Antrim, UK). For HIV, a rapid Ag/Ab Combo test was used to detect antibodies and for positve patients, an ELISA kit was used for confirmation and differentiation (*ImmunoComb*® II *HIV* 1 & 2 BiSpot, Ireland, UK).

C. Statistical analysis

The collected data were analysed with STATA 11.2statistical package (StataCorporation, college station, Texas). The main outcome of interest was HBsAg and anti-HIV positive serology which were expressed as a percentage of the study population and stratified according to age, sex and etiology of kidney disease. Continuous variables were expressed using means and standard deviations or medians and interquartile ranges (IQR) where necessary. Measures of association between potential risk factors and positive serology were establised and expressed as odd ratios (OR) together with their 95% Confidence interval (CI). Evidence of association was considered for a two tailed p-value of less than 0.05.

RESULTS

During the study period, 166 patients were included, 63.9% of whom were men (Table 1). The mean age was 49.2 ± 14.2 years, median duration in dialysis was 24 months (IQR): 8 – 42] with men having a longer median duration in dialysis than women, though not statistically significant (25months, IQR: 8 – 45 vs.

18months, IQR: 8 – 37, p=0.2). The main etiologies of ESRD were hypertension 25.9%, chronic glomerulonephritis 17.5% and diabetes mellitus 16.3%. In the study population, 22.9% of patients had no identified etiology of ESRD. Among those with HIV associated kidney disease 83.3% were already known to be HIV infected before the diagnosis of ESRD (Table 1). In HIV infected patients the median CD4 count was 313cells/µL (IQR: 128 – 816).

Table 1: Prevalence of HBsAg among 166 HD patients by age group, sex, cause of ESRD and duration in dialysis

	N	% of study population	HBsAg	P value (Fisher's exact)
Age group				
<30	16	9.6	2 (1.2)	0.4
30 – 39	24	14.5	4 (2.4)	
40 – 49	48	28.9	3 (1.8)	
50 – 59	34	20.5	1 (0.6)	
60 – 69	32	19.3	2 (1.2)	
>70	12	7.2	1 (0.6)	
Sex				
Male	106	63.9	10 (6.0)	0.07
Female	60	36.1	3 (1.8)	
Presumed cause ESRD				
Hypertension	43	25.9	4 (2.4)	0.9
Chronic glomerulonephritis	29	17.5	3 (1.8)	
Diabetes	27	16.3	1 (0.6)	
HIV associated nephropathy	15	9.0	1 (0.6)	
Interstitial chronic nephritis	14	8.4	1 (0.6)	
Unidentified cause	38	22.9	3(1.8)	
Duration in Dialysis				
<24months	83	50	11	0.01
>24months	83	50	2	
Total	**166**	**100**	**13 (7.8)**	/

Serological findings

In our study population, 18.7% (28/166) of patients had markers of at least one of the two viral infections with anti-HIV being the more common (Table 1). Prevalence of HBsAg and HIV were respectively 7.8% (13/166) and 10.8% (18/166). Men had a higher prevalence of HBsAg than women (9.4% vs. 5%), though the difference was not statistically significant. HBsAg negative patients had a statistically significant longer duration in dialysis (9 months, IQR: 5 – 12) than HBsAg positive patients (25months, IQR: 9 – 43), p<0.001. There was no statistical significant difference in the duration in dialysis among HIV positive and negative patients (8 months, IQR: 5 – 24 vs. 25 months, IQR: 9 – 43, p=0.2)(Table 2). Only one patient (0.6%) was found to be HIV-HBV co-infected. A history of sexually transmitted infections (STI), scarification or previous transfusions were not found to be associated with positive serology to the two viral infections. However patients who had been on dialysis for at least 24 months were less likely to be HBsAg and HIV positive, OR: 0.2 (95%CI 0.03 – 0.8, p<0.01) and OR: 0.3 (95%CI 0.1 – 1.0, p<0.05) respectively.

Table 2: Prevalence of HIV among 166 HD patients by age group, sex, cause of ESRD and duration in dialysis

	N	%	HIV	P
Age group				
<30	16	9.6	0 (0)	0.08
30 – 39	24	14.5	5 (3.0)	
40 – 49	48	28.9	8 (4.8)	
50 – 59	34	20.5	1 (0.6)	
60 – 69	32	19.3	4 (2.4)	
>70	12	7.2	0 (0)	
Sex				
Male	106	63.9	8 (4.8)	0.07
Female	60	36.1	10 (6.0)	
Presumed cause ESRD				
Hypertension	43	25.9	1 (0.6)	0.001
Chronic glomerulonephritis	29	17.5	0 (0.0)	
Diabetes	27	16.3	2 (1.2)	
HIV associated nephropathy	15	9.0	15 (9.0)	
Interstitial chronic nephritis	14	8.4	0 (0)	
Unidentified cause	38	22.9	0 (0)	
Duration in dialysis				
<24months	83	50	13	0.05
>24months	83	50	5	
Total	**166**	**100**	**18 (10.8)**	/

DISCUSSION

This cross sectional study carried out on 166 chronic HD patients showed that the study population was predominantly male (63.9%) and relatively young, whereas the median duration on maintenance hemodialysis was two years. The prevalence of HBsAg, HIV and HBsAg-HIV coinfection were 7.8%, 10.8% and 0.6% respectively. HBsAg and HIV negative serology was paradoxically associated with longer duration in HD and there was no significant association between socio-demographic characteristics and both HBsAg and HIV infections.

The prevalence of HBsAg in our study was 7.8%. For a high risk group it is similar to the prevalence in the general population [11, 12]. This could suggest that though HBV disease burden has been shown to be higher among HD patients in some studies [3] compared to the general population, our study failed to show that. This shows that the prevalence among HD patients is a reflection of the burden of HBV in Cameroon. Our finding however is similar to that of Zahedi in Iran and Su in China studies [14, 15] but higher than what was found by Gasim in Soudan and Alashek in Lybia [16-18]. These differences in prevalence across settings might simply be reflecting the burden of Hepatitis B viral infection in these settings.

Concerning the prevalence of HIV, we found that in HD patients in Douala, the prevalence is double the national estimate [6, 19]. Given that HIV has been shown to be a significant cause of ESRD, and the fact that the dialysis unit of the DGH is the main dialysis centre of this national region could explain this high prevalence. This is because all HIV patients in the region with ESRD are referred to this HD centre, most especially as most of the HIV patients were already diagnosed with HIV before initiating dialysis. Nevertheless, relatively few studies on the prevalence of HIV in HD patients have been carried out in other settings. In one study in South-East Iran [14] and in Casablanca in Morocco [20], no HD patient was found to be HIV-infected. This might be reflecting the relatively low burden of HIV in those settings and may be also the thorough application of infection control measures.

In our study population, coinfection rate HBV-HIV was low (0.6%) even though the prevalence of each viral infection was high. In other settings with similar studies and population, coinfection rate were even lower most especially as some authors found no HD patient to be HIV infected [14, 20, 21]. This might be suggesting that contrary to what might be assumed that coinfection rates directly correlate with the burden of individual infections, other factors which we could not capture in this study, could be determining the patterns of co-infections in our setting.

We did not find any socio-demographic factor to be associated with the risk of infection, similar to findings in other studies [16, 17]. In a study in Sudan, longer duration in dialysis was associated with the risk of HBV infection [16]. In our study, HBsAg and HIV negative serology was paradoxically associated with longer duration in dialysis. This could be because patients with severe diseases associated with HBV and/or HIV could have died before initiation of dialysis such that those studied were those who survive. We however acknowledge that this association could be a caveat due to our small study population.

Our study had some limitations. Firstly, our findings are those of a single dialysis center and so cannot be generalised to the general population of HD patients in Cameroon. Secondly, the cross sectional nature of the study could not permit us to determine the incidence of these infections.

CONCLUSION

HBV and HIV infections are common among haemodialysis patients in Douala. The burden of HBV infection reflects that in the general population and that of HIV reflects the burden of HIV as a cause of ESRD. Elaboration of, as well as emphasis on strict adherence to infection control measures are indispensable to reduce the burden of blood borne viral infections among HD patients.

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Author contributions

HMP, HNL, AG and TE designed the study. HMP and TV collected and entered the data. Analysis was done by TE, HMP and HNL and they were assisted by KFF in the manuscript write up. BSM and AG proofread the manuscript. All authors read and approved the final manuscript to be submitted.

Conflict of interest

The authors declare no conflict of interest.

REFERENCES

[1] Wreghitt TG, *Blood-borne virus infections in dialysis units--a review.* Reviews in medical virology, 1999; **9**(2): p. 101-9.

[2] 2. Fabrizi F, Martin P, and Messa P, *Hepatitis B and hepatitis C virus and chronic kidney disease.* Acta gastro-enterologica Belgica, 2010; **73**(4): p. 465-71.

[3] 3. Fabrizi F, Lunghi G, and Martin P, *Hepatitis B virus infection in hemodialysis: recent discoveries.* Journal of nephrology, 2002; **15**(5): p. 463-8.

[4] 4. Fabrizi F, Poordad FF, and Martin P, *Hepatitis C infection and the patient with end-stage renal disease.* Hepatology, 2002; **36**(1): p. 3-10.

[5] 5. World Health Organisation. *Hepatitis B. World Health Organisation Fact Sheet 204 (Revised August 2008).* 2008; [cited 2013 April 20]; Available from: http://www.who.int/mediacentre/factsheets/fs204/en/index.html.

[6] 6. UNAIDS., *Report on the global HIV/AIDS epidemic*, 2011; Joint United Nations Programme on HIV/AIDS: Geneva.

[7] 7. Fabrizi F, Messa P, and Martin P, *Hepatitis B virus infection and the dialysis patient.* Seminars in dialysis, 2008; **21**(5): p. 440-6.

[8] 8. Madhava V, Burgess C, and Drucker E, *Epidemiology of chronic hepatitis C virus infection in sub-Saharan Africa.* The Lancet infectious diseases, 2002; **2**(5): p. 293-302.

[9] 9. Jobarteh M, Malfroy M, Peterson I, Jeng A, Sarge-Njie R, Alabi A*, et al.*, *Seroprevalence of hepatitis B and C virus in HIV-1 and HIV-2 infected Gambians.* Virology Journal, 2010; **7**: p. 230.

[10] 10. Telaku S, Fejza H, Elezi Y, and Bicaj T, *Hepatitis B and C in dialysis units in Kosova.* Virology Journal, 2009; **6**: p. 72.

[11] 11. Mbanya DN, Takam D, and Ndumbe PM, Serological findings amongst first-time blood donors in Yaounde, Cameroon: is safe donation a reality or a myth? Transfusion medicine, 2003; **13**(5): p. 267-73.

[12] 12. Ndumbe PM and Skalsky J, *Hepatitis C virus infection in different populations in Cameroon.* Scandinavian journal of infectious diseases, 1993; **25**(6): p. 689-92.

[13] 13. Kaze FF, Kengne AP, Choukem SP, Dzudie A, Halle MP, Dehayem MY*, et al.*, *Dialysis in Cameroon.* American journal of kidney diseases : the official journal of the National Kidney Foundation, 2008; **51**(6): p. 1072-4; author reply 1074.

[14] 14. Zahedi MJ, Darvish Moghaddam S, Alavian SM, and 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**(5): p. 339-43.

[15] 15. Su Y, Yan R, Duan Z, Norris JL, Wang L, Jiang Y, et al., Prevalence and risk factors of hepatitis C and B virus infections in hemodialysis patients and their spouses: a multicenter study in Beijing, China. J Med Virol, 2013; **85**(3): p. 425-32.

[16] 16. Gasim GI, Hamdan HZ, Hamdan SZ, and Adam I, Epidemiology of hepatitis B and hepatitis C virus infections among hemodialysis patients in Khartoum, Sudan. Journal of medical virology, 2012; **84**(1): p. 52-5.

[17] 17. Alashek WA, McIntyre CW, and Taal MW, Hepatitis B and C infection in haemodialysis patients in Libya: prevalence, incidence and risk factors. BMC infectious diseases, 2012; **12**: p. 265.

[18] 18. Khosravani A, Sarkari B, Negahban H, Sharifi A, Toori MA, and Eilami O, *Hepatitis B Infection among high risk population: a seroepidemiological survey in Southwest of Iran.* BMC infectious diseases, 2012; **12**: p. 378.

[19] 19. UNICEF, *Cameroon statistic.* Available on http://www.unicef.org/infobycountry/cameroon_statistics.html . Accessed on 27/08/2012, 2010.

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

[21] 21. Bosevska G, Kuzmanovska G, Sikole A, Dzekova-Vidimilski P, and Polenakovic M, Screening for hepatitis B, C and HIV infection among patients on haemodialysis (cross sectional analysis among patients from two dialysis units in the period January to July 2005). Prilozi / Makedonska akademija na naukite i umetnostite, Oddelenie za biloski i medicinski nauki = Contributions / Macedonian Academy of Sciences and Arts, Section of Biological and Medical Sciences, 2009; **30**(2): p. 159-74.