Prevalence of Hepatitis C Virus and Other Comorbidities in Dialysis Population of Elbasan City, Albania

Elezi Brunilda1*, Topi Skender2, Abazaj Erjona3, Bolleke Erjola4 and Kasa Marsida5

1Faculty of Technical Medical Sciences, “Aleksander Xhuvani” University, Albania
2“Aleksander Xhuvani” University, Albania
3Department of Epidemiology and Control of Infectious Diseases, Institute of Public Health, Albania
4Nephrology and Dialysis Unit, UHC Mother Theresa, Albania
5Trauma University Hospital, Albania

*Corresponding author: Brunilda Elezi, PhD, “Aleksander Xhuvani” University, Faculty of Technical Medical Sciences, Elbasan, Albania, Tel: +355674087536

Abstract

Introduction: Hepatitis C virus (HCV) infection is associated with increased morbidity and mortality among patients on dialysis (HD). The aims of this study were to estimate the presence of HCV and other comorbidities in the dialysis population of Elbasan city, and to compare the survival outcomes of those patients who started dialysis with haemodialysis and peritoneal dialysis.

Methods: In the present study, we have used a socio-demographic questionnaire to collect data from HD patients. We studied 108 dialysis patients in dialysis Centre for 1 year. Software SPSS version 20.0, were used to analyzed and evaluate the data. P < 0.05 was considered statistically significant.

Results: Over of all 108 patients with dialysis, HCV infection was present in 15.7% of them. Male patients were 74% and female 26%. Age groups 50-59 and 60-69 were the most frequent among dialysis patients with 35.1% and 34.25% cases respectively. There is a significant association for age of dialysis patients and the presence of HCV for p < 0.001. Regarding the co-morbidities in dialysis patients our findings suggest that diabetes mellitus tip 2 (16/108 patients), Hypertension arterial HTA (56/108), Coronary artery disease (16/108), and Arrhythmia (12/108) were more prevalent diseases in our patients. A significant association we found for cardiovascular disease in dialysis patients and the presence of HCV p = 0.0001. Based to Kaplan-Meier and univariate Cox regression performed to estimate risk factor in haemodialysis patients, adjusted survival rates HD vs. PD patients was significantly different (hazard ratio 14.75, CI 95% [8.92-44.76]) p value < 0.0001).

Conclusion: In this study we have observed a significant association of HCV infection with some socio-demographic data of dialysis patients, and also with cardiovascular disease. We suggest that prospective studies should be performed to evaluate the role of HCV infection and other comorbidities in dialysis patients.

Keywords
Comorbidities, Dialysis patients, HCV, Prevalence, Elbasan city

Introduction

Hepatitis C virus (HCV) infection is associated with increased morbidity and mortality among patients on dialysis [1-3]. HCV virus is one of the most frequent causes of chronic viral liver disease in dialysis patients [4]. The spread of HCV in dialysis units is declining, but the prevalence of HCV in dialysis patients remains high [5]. Worldwide the prevalence of this infection in the dialysis population varies from 1% to more than 80% [6-12]. A number of risk factors have been identified for HCV infection among dialysis patients like the number of blood transfusions, duration of the dialysis treatment etc [13-15]. This high risk is due to poor infection-control measures [16,17]. Some studies have shown that the prevalence and incidence of HCV infections remain high among dialysis patients. It may be explained by transmission within dialysis centers, probably because
of inadequate adherence to infection control measures [16,17]. HCV infection has been seen to play a role in pathogenesis of Diabetes Mellitus, Atherosclerosis, and Steatosis which may increase the risk of cardiovascular diseases [2,18-24] in dialysis patients. HCV-infected dialysis patients have a higher prevalence of inflammation-related metabolic and vascular diseases, leading to high rates of cardiovascular mortality in patients with end-stage renal disease. Steatosis occurs in 40%-86% of patients with chronic hepatitis C, and its frequency varies with genotype [2,18,25-27]. The aim of this study was to estimate the presence of hepatitis C virus (HCV) and co-morbidities in the dialysis patients of Elbasan dialysis unit.

Methods

This is a cohort study and was performed in dialysis unit of Elbasan city (all adults’ ≥ 18-years-old) for one year. In the present study, we have analyzed 108 recorded files from dialysis patients. We have filled a questionnaire with data taken out from record files for each dialysis patient. Characteristics for socio-demographic, presence of Hepatitis C Virus (HCV) and the co-morbidities were used for each of them. The software SPSS version 20.0, were used to analyze and evaluate the data obtain in this study. Epidemiological data are presented as frequency, mean and percentage. Further statistical analysis of risk factors for HCV infection (age, number and duration on dialysis, etc) was performed by multivariate analysis and Fisher’s exact test. P value < 0.05 was considered statistically significant.

Results

Over of all 108 patients with dialysis, Hepatitis C Virus (HCV) was present in 15.74% of them (Figure 1).

Regarding the gender of dialysis patients involved in our study, male patients were 74% and female 26% [28]. We found a significant association between the gender and presence of HCV infection in dialysis patients. Age groups 50-59 and 60-69 were the most frequent among dialysis patients with 35.1% and 34.25% cases respectively. The other age groups have the same percentage 10.2% of cases.

![Figure 1: Prevalence of Hepatitis C in dialysis patients.](image)

Table 1: The socio-demographic data and presence of HCV infection in dialysis patients.

| Variables            | Number of patients | HCV-infected patients |
|----------------------|--------------------|-----------------------|
| Gender               |                    |                       |
| Female               | 28                 | 5                     |
| Male                 | 80                 | 12                    |
| Age groups           |                    |                       |
| 18-39                | 11                 | 1                     |
| 40-49                | 11                 | 3                     |
| 50-59                | 38                 | 8                     |
| 60-69                | 37                 | 4                     |
| ≥ 70                 | 11                 | 1                     |
| Residence area       |                    |                       |
| Rural area           | 49                 | 8                     |
| Urban area           | 59                 | 9                     |
| BMI                  |                    |                       |
| Under weight         | 10                 | 2                     |
| Normal               | 57                 | 10                    |
| Pre-Obese            | 35                 | 4                     |
| Obese                | 6                  | 1                     |
| Living condition     |                    |                       |
| Living with family   | 99                 | 16                    |
| Living alone         | 9                  | 1                     |
| School level         |                    |                       |
| Without education    | 8                  |                       |
| Primary education    | 45                 |                       |
| Secondary            | 44                 |                       |
| University           | 10                 |                       |
| Marital statue       |                    |                       |
| Single               | 7                  |                       |
| Widow                | 7                  |                       |
| Divorced             | 3                  |                       |
| Married              | 91                 |                       |
| Occupation           |                    |                       |
| Unemployed           | 63                 | 9                     |
| Employed             | 5                  | 1                     |
| Invalid              | 40                 | 7                     |
| Monthly income*lek   |                    |                       |
| Low income (< 200.000) | 66           | 14                    |
| Moderate (200.000-400.000) | 36     | 2                     |
| High income (> 400.000) | 6           | 1                     |
| Smoking              |                    |                       |

The age groups and the presence of HCV have resulted with a significant association between them for p value < 0.0001. A statistically significant association was seen also for residence area and alcohol use among patients with HCV infection. We did not find statistical association for the other risk factors and presence of HCV infection.
mographic data for 108 dialysis patients.

The Table 2 below presents dialysis data of 108 patients involved in our study. In most of data obtained by record file of dialysis patients, there is a strong significance association between presences of HCV and the originated of renal disease, time of dialysis start, Yes 20 4
No 88 13
Alcohol use* p = 0.002
Yes 49 9
No 54 8

1Lek: Albania money; 2For some cases we not have data.

Table 2: Dialysis data for patient involved in study.

| Dialysis data of patients | Number of cases | HCV positive |
|---------------------------|-----------------|--------------|
| **Originated of renal disease** |                |              |
| Chronic glomerulonephritis | 34              | 9            |
| Chronic pyelonephritis    | 32              | 3            |
| Rheumatoid arthritis      | 1               | 0            |
| Diabetes Mellitus          | 18              | 1            |
| Ren polycystic             | 9               | 0            |
| Accident, kidney trauma    | 2               | 1            |
| Chronic Kidney Disease (CKD)| 2               | 1            |
| Hypertensive nephropathy   | 3               | 0            |
| With more than one cause   | 6               | 2            |
| **Time of dialysis start (years)** |                |              |
| Less than four years      | 108             | P value < 0.0001 |
| More than four years      | 56              | 9            |
|               | 52              | 3            |
| **Frequency of dialysis** |                |              |
| Two times in week or less | 108             | P value = 0.001 |
| Three times in week or more| 10             | 5            |
|                      | 98              | 12           |
| **Duration of dialysis (hours)** |            |              |
| Less than four hours      | 108             | P value = 0.05 |
| More than four hours      | 20              | 2            |
|                      | 88              | 15           |
| **Forms of dialysis therapy (HD or PD)** |        |              |
| HD                        | 108             | P value = 0.001 |
| PD                        | 56              | 9            |
| HD and PD (both)          | 41              | 7            |
|                      | 11              | 1            |
| **Infection by fistula/catheter** |        |              |
| Yes                      | 104             | P value = 0.03 |
| No                       | 50              | 9            |
|                      | 54              | 8            |
| **The way how is introduced into dialysis** |        |              |
| Planning                 | 108             | P value = 0.61 |
| Emergency                | 100             | 15           |
|                      | 8               | 2            |

*HD Haemodialysis and PD Peritoneal dialysis.

Table 3: Presence of Comorbidities among dialysis patients.

| Comorbidities               | Number of patients | HCV-infected patients |
|----------------------------|--------------------|-----------------------|
| Diabetes Mellitus          | 25                 | p value 0.37          |
| Type 1                     | 9                  | 2                     |
| Type 2                     | 16                 | 1                     |
| Cardiovascular diseases    | 104                | p value = 0.0001      |
| Hypertension arterial HTA  | 56                 | 8                     |
| Arrhythmia                 | 12                 | 2                     |
| Congestive heart failure   | 7                  | 1                     |
| Ischemic heart disease     | 6                  | 0                     |
| Acute myocardial infarction| 7                  | 1                     |
| Coronary artery disease    | 16                 | 6                     |
frequency dialysis etc. We did not find significant association for the way how patients are introduced into dialysis process.

Presence of co-morbidities in dialysis patients came out in the most dominant part of patients. Between the Diabetes Mellitus Type 1 and Type 2, the most predominant were Diabetes Mellitus type 2, in 14.8% of all patients. The prevalence for cardiovascular diseases was 96.3% of dialysis patients. Most commonly was hypertension in 52% of all patients. HCV was most present in patients with hypertension and coronary artery disease. A significant association was seen for cardiovascular diseases and presence of HCV among dialysis patients (Table 3).

Also, in our study we have comparing patient survival of Haemodialysis (HD) and Peritoneal Dialysis (PD). We found that the survival outcomes were differ between PD and HD patients during the month of dialysis treatment, the risk of death was significantly higher in patients initiating dialysis with PD (Figure 2).

Discussion

It is well known that dialysis patients are at high risk for hepatitis C infection. Interval of HCV prevalence infections among dialysis patients varies, from country to country. The prevalence rank from 3% in northern Europe more than 20% in southern Europe [29,30]. This infectious disease is a recently identified and under-recognized risk factor for patients with problems in kidneys like them in dialysis process [31]. In our study, prevalence of HCV infection among dialysis patients was present in 15.74% of them. This prevalence is lower than a study conducted by Di Lal-lo, et al., in Italy [13], but is to higher with another study conducted by Sandhu, et al. in Canada [32].

The HCV infection and some co-morbidity are well known as risk factors for kidney disease. The most common risk factors for kidney disease are older age, hypertension, dyslipidaemia, coronary heart disease, diabetes, and cirrhosis [32-34]. The prevalence rate of HCV infection was higher in men than female sex because male is more vulnerable to be infected with HCV than female population [35].

The finding of our study report that male was the most predominant sex (74.07%) affected by kidney disease and from HCV infection (70.6%) compared to female with significant association p < 0.0001. Older ages are a risk factor for dialysis patients [32,33], so in our study patients over 50-years-old, presented the most prevalent cases. There are a significant association for age of dialysis patients and the presence of HCV for p < 0.001. A multivariate analysis of risk factors showed a significant association with metropolitan area of residence and HCV in dialysis patients in Italy [13]. Regarding the residence area of our patients, as a risk factor for dialysis, more than half of our patients living in urban area (54.6%) and the other in rural area (45.4%) with significant association between them and presence of HCV for p value < 0.001. A significant association between alcohol use by dialysis patients and presence of HCV was seen for p value < 0.001. We didn’t find significant association for the other demographic data processed by us.

Regarding the co-morbidities in dialysis patients our findings suggest that diabetes mellitus tip 2 (16/108
patients), Hypertension arterial HTA (56/108), Coronary artery disease (16/108), and Arrhythmia (12/108) were more prevalent diseases in our patients. A significant association we found for cardiovascular disease in dialysis patients and the presence of HCV p = 0.0001.

Some studies suggest that HCV infection has an adverse impact on renal function. Meyers, et al. in their study, see that HCV infection is associated with extra-hepatic diseases, including various types of glomerulonephritis [36,37]. Also, Soma, et al. and Arase, et al. has indicated that HCV infection leads to a rapid worsening in the renal function of patients with diabetic nephropathy [38,39].

As seen in Table 2, most of data obtained by patient’s files show up a strong significance between them and the presence of HCV (like, originated of renal disease, time of dialysis start time, dialysis frequency etc). We did not find significance association for the way how patients are introduced into dialysis process.

Regarding the Kaplan-Meier and univariate Cox regression performed to estimate the time of dialysis treatment as risk factor in dialysis HD vs. PD patients, adjusted survival rates was significantly different (hazard ratio 14.75, CI 95% [8.92-44.76]) p value < 0.0001. The risk of death was significantly higher in patients initiating dialysis with PD (Figure 2).

Conclusion

Hepatitis C Virus (HCV) is an emerging global public health issue with relevance in dialysis patients. The HCV prevalence of dialysis patients in Elbasan city remained at a moderate level of 15.74%, which might be increased among haemodialysis patients because of long-term haemodialysis and blood transfusion of patients. In this study we have observed a significant association of HCV infection with some socio-demographic data of dialysis patients, and with cardiovascular disease. We found that the survival outcomes were differ between PD and HD patients during the month of dialysis treatment, the risk of death was significantly higher in patients initiating dialysis with PD. We suggest that prospective studies should be performed to evaluate the role of HCV infection and other comorbidities in dialysis patients.

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Conflict of Interest

Me, Brunilda Elezi, lecturer at the University Alexander Xhuvani, in Elbasan city, Albania, I declare that I don’t have any conflict of interest (person of institution). All the data presented in this paper have been collected by my part and the patient’s anonymity is preserved.

Ethical Issues

In our country, there is not one ethics committee that approved the study, but we are allowed to do a study after we are given permission by the head of the institution where the study is carried out.

References

1. Etik DO, Ocal S, Boyacioglu AS (2015) Hepatitis C infection in hemodialysis patients: A review. World J Hepatol 7: 885-895.
2. Al-Rabadi L, Box T, Singhania G, Al-Marji C, Agarwal A, et al. (2018) Rationale for treatment of hepatitis C virus infection in end-stage renal disease patients who are not kidney transplant candidates. Hemodial Int 1: 45-52.
3. Debure A, Degos F, Pol S, Ft AL (1988) Liver disease and hepatic complications in renal transplant patients. Adv Nephrol 17: 375-400.
4. Knudsen F, Wantzin P, Rasmussen K, Løkkegaard N, et al. (1993) Hepatitis C in dialysis patients: relationship to blood transfusions, dialysis and liver disease. Kidney Int 43: 1353-1356.
5. Selcuk H, Kanbay M, Korkmaz M, Gur G, Akcay A, et al. (2006) Distribution of HCV genotypes in patients with end-stage renal disease according to type of dialysis treatment. Dig Dis Sci 51: 1420-1425.
6. Fissell RB, Bragg-Gresham JL, Woods JD, Jadoul M, Gillespie B, et al. (2004) Patterns of hepatitis C prevalence and seroconversion in hemodialysis units from three continents: the DOPPS. Kidney Int 65: 2335-2342.
7. Dalekos GN, Boumba DS, Katopodis K, Zervou E, Sferopoulos G, et al. (1998) Absence of HCV viraemia in anti-HCV-negative haemodialysis patients. Nephrol Dial Transplant 13: 1804-1806.
8. Di Napoli A, Pezzotti P, Di Lallo D, Petrosillo N, Trivelloni C, et al. (2006) Epidemiology of hepatitis C virus among long-term dialysis patients: a 9-year study in an Italian region. Am J Kidney Dis 48: 629-637.
9. Pragati Chigurupati, Subbarayudu, Sarath Babu (2014) Study of incidence of hepatitis C virus infection in haemodialysis patients. Annals of Tropical Medicine and Public Health 7: 167-170.
10. Sun J, Yu R, Zhu B, Wu J, Larsen S, et al. (2009) Hepatitis C infection and related factors in hemodialysis patients in china: systematic review and meta-analysis. Ren Fail 31: 610-620.
11. Alavian SM, Kabir A, Ahmadi AB, Lankarani KB, Shahbabaie MA, et al. (2010) Hepatitis C infection in hemodialysis patients in Iran: a systematic review. Hemodial Int 14: 253-226.
12. Dentiico P, Buongiorno R, Volpe A, et al. (1992) Prevalence and incidence of HCV in hemodialysis patients: Study of risk factors. Clin Nephrol 38: 49-52.
13. Di Lallo D, Micelli M, Petrosillo N, Perucci CA, Moscatelli M (1999) Risk factors of hepatitis C virus infection in patients on hemodialysis: a multivariate analysis based on a dialysis register in Central Italy. Eur J Epidemiol 15: 11-14.

14. Okuda K, Hayashi H, Kobayashi S, Irie Y (1995) Mode of hepatitis C infection not associated with blood transfusion among chronic hemodialysis patients. J Hepatol 23: 28-31.

15. Hinrichsen H, Leimenstoll G, Stegen G, Schrader H, Fölsch UR, et al. (2002) Prevalence and risk factors of hepatitis C virus infection in haemodialysis patients: a multicentre study in 2796 patients. GUT 51: 429-433.

16. Allander T, Medin C, Jacobson SH, Grillner L, Persson MA (1994) Hepatitis C transmission in a hemodialysis unit: molecular evidence for spread of virus among patients not sharing equipment. J Med Virol 43: 415-419.

17. Schneeberger PM, Keur I, van Loon AM, Mortier D, de Coul KO, et al. (2000) The Prevalence and Incidence of Hepatitis C Virus Infections Among Dialysis Patients in the Netherlands: A Nationwide Prospective Study. J Infect Dis 182: 1291-1299.

18. Kraj D, Jukić LV, Stojšavljević S, Duvnjak M, Smolic M, et al. (2016) Hepatitis C Virus, Insulin Resistance, and Steatosis. J Clin Transl Hepatol 4: 66-75.

19. Vanni E, Abate ML, Gentilcore E, Hickman I, Gambino R, et al. (2009) Sites and mechanisms of insulin resistance in nonobese, nondiabetic patients with chronic hepatitis C. Hepatology 50: 836-840.

20. Milner KL, van der Poorten D, Trenell M, Jenkins AB, Xu A, et al. (2010) Chronic hepatitis C is associated with peripheral rather than hepatic insulin resistance. Gastroenterology 138: 932-941.

21. Petit JM, Bour JB, Galland-Jos C, Minello A, Verges B, et al. (2001) Risk factors for diabetes mellitus and early insulin resistance in chronic hepatitis C. J Hepatol 35: 279-283.

22. Hui JM, Sud A, Farrell GC, Bandara P, Byth K, et al. (2003) Insulin resistance is associated with chronic hepatitis C virus infection and fibrosis progression. Gastroenterology 125: 1695-1704.

23. Fartoux L, Poujol-Robert A, Guéchot J, Wendum D, Poupon R, et al. (2005) Insulin resistance is a cause of steatosis and fibrosis progression in chronic hepatitis C. Gut 54: 1003-1008.

24. Hsu CS, Liu CJ, Liu CH, Wang CC, Chen CL, et al. (2008) High hepatitis C viral load is associated with insulin resistance in patients with chronic hepatitis C. Liver Int 28: 271-277.

25. Cheng FK, Torres DM, Harrison SA (2014) Hepatitis C and lipid metabolism, hepatic steatosis, and NAFLD: still important in the era of direct acting antiviral therapy?. J Viral Hepat 21: 1-8.

26. Lonardo A, Adinolfi LE, Restivo L, Ballestri S, Romagnoli D, et al. (2014) Pathogenesis and significance of hepatitis C virus steatosis: An update on survival strategy of a successful pathogen. World J Gastroenterol 20: 7089-7103.

27. Asselah T, Rubbia-Brandt L, Marcellin P, Negro F (2006) Steatosis in chronic hepatitis C: why does it really matter? Gut 55: 123-130.

28. McIntyre PG, McCrudden EA, Dow BC, Cameron SO, McMilan MA, et al. (1994) Hepatitis C virus infection in renal dialysis patients in Glasgow. Nephrol Dial Transplant 9: 291-295.

29. Schneeberger PM, Keur I, Van der Vliet W, van Hoek K, Boswijk H, et al. (1998) Hepatitis C virus infection in dialysis centers in The Netherlands: a national survey by serological and molecular methods. J Clin Microbiol 36: 1711-1715.

30. Valderrábano F, Jones EH, Mallick NP (1995) Report on management of renal failure in Europe, XXIV, 1993. Nephrol Dial Transplant 10: 1-25.

31. Yang CW (2007) Leptospirosis renal disease: understanding the initiation by toll-like receptors. Kidney Int 72: 918-925.

32. Sandhu J, Preiksaitis JK, Campbell PM, Carrieri KC, Hessel PA (1999) Hepatitis C prevalence and risk factors in the northern Alberta dialysis population. Am J Epidemiol 150: 58-66.

33. Kuo HW, Tsai SS, Tiao MM, Yang CY (2007) Epidemiological features of CKD in Taiwan. Am J Kidney Dis 49: 46-55.

34. Asrani SK, Buchanan P, Pinsky B, Rey LR, Schnitzler M, et al. (2010) Lack of association between hepatitis C infection and chronic kidney disease. Clin Gastroenterol Hepatol 8: 79-84.

35. Liu YB, Xie JZ, Zhong CJ, Liu K (2014) Hepatitis C virus infection among hemodialysis patients in Asia: a meta-analysis. Eur Rev Med Pharmacol Sci 18: 3174-3182.

36. Arase Y, Ikeda K, Murashima N, Chayama K, Tsubota A, et al. (1999) Hepatitis C and renal disease: an update. Am J Kidney Dis 33: 79-84.

37. Meyers CM, Seeff LB, Stehman-Breen CO, Hoofnagle JH (1994) Hepatitis C prevalence and risk factors in the northern Alberta dialysis population. Am J Epidemiol 150: 58-66.

38. Soma J, Saito T, Taguma Y, Chiba S, Hata M, et al. (2010) Chronic hepatitis C and renal disease: an update. Am J Kidney Dis 42: 631-657.

39. Arase Y, Suzuki F, Kawamura Y, Akuta N, Sezaki H, et al. (2011) Development rate of chronic kidney disease in hepatitis C virus patients with advanced fibrosis after interferon therapy. Hepatol Res 41: 946-954.