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Prevalence of hepatitis B and C in hemodialysis patients in Mosul city consider blood and Derivative transfusion, equipment contamination and others as arisk factors

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ABSTRACT

Aims: Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are significant health problems, as they can lead to chronic active hepatitis, liver cirrhosis, and hepatic carcinoma. Factors associated with HBVand HCV propagation include blood and derivate transfusion, duration and frequency of hemodialysis, equipment contamination and contact among patients as well as between them and health-care workers. The aim of this study was to determine the prevalence of HBV and HCV infections in hemodialysis patients in Mosul city.

A cross-sectional analysis was performed on 262 patients on hemodialysis in the hemodialysis unit of Ibn-Sina hospital throughout the period from 1st of February 2015 to 1st of August 2015. The following data was collected: name, age, gender, duration of dialysis and number of blood units transfused. Blood samples were collected and screened for HBsAg and anti-HCV antibodies by a third-generation enzyme-linked immunosorbent assay (ELISA).

Results*:* Out of 262 patients, 154 (58.77%) and 108 (41.33%) were male and female, respectively, with a mean ±SD age of 48.11±15.48 years. The overall prevalence rate of hepatitis B surface antigen (HBsAg) positivity Was 2.67% (7/262,) and that of anti- Hepatitis C Virus positivity was 6.49% (17/262).

There was no significant association between the risk of HBV and HCV infection with age(p=0.810 and p=0.504 respectively) or gender (p=0.680 and p=0.672 respectively) of the patients.

In addition, the results indicates that higher prevalence of hepatitis B surface antigen (HBsAg) and anti- Hepatitis C Virus positivity were significantly associated with the duration of dialysis and number of blood units transfused(p=0.001 and p=0.001, respectively**.**

Key words: anti- Hepatitis, ELISA,(HBV), (HCV)

INTRODUCTION

Kidney Failure

Kidneys are the first and so far the only organs whose function can be replaced by a machine. Kidney Failure can be acute, called Acute Kidney Injury (AKI) or chronic, called Chronic Kidney Disease (CKD).When patients of CKD have reached stage 4(Glomerular Filtration Rate (GFR) < 30 ml /min / 1.73 m2), ideally they are under a Nephrologist care. Stage 5 CKD (GFR is < 15ml/min /1.73 m2), is called dialysis stage. Renal Replacement Therapy "RRT" means either dialysis or transplantation. Worldwide, the machine of dialysis had served millions of ESRD patients. [(1]

Hemodialysis

Hemodialysis is routinely used as renal replacement therapy for end stage renal disease (ESRD) patients [(2)].Hemodialysis uses a machine to clean the blood. During treatment through the dialysis machine, and back to the body. While it is in the machine, the blood goes through a special filter (called a dialyzer), which removes waste and fluid. [(2)] In order to have any type of hemodialysis, you will need to have a vascular access. The vascular access is the place on the body that needles are inserted during treatments. This is how the blood will exit and return to the body.

The dialysis unit of the hospital has thirty hemodialysis machines. Among these, three are dedicated for HBV and HBV/HCV co infected patients and three machines are dedicated for HCV positive patients. These six machines are placed awayfrom the rest of the machines in an isolated room, so asto avoid cross contamination. The dialyzers of the patients are reused. Reprocessing of the dialyzers of the HBV / HCV positive patients are done in a separate room, away from the rest of the patients. Dedicated nursing staff look after each patient during the dialysis session.

Blood samples were drawn from the patients before the start of the first hemodialysis and every three months thereafter. The serum samples were tested for HBsAg and anti HCV antibody. Any patient positive for HBsAg or anti HCV or to both were dialyzed on the dedicated machines (3)

Study design:
A cross sectional study design was selected in order to achieve the objective of the present study.

Study Sample
All patients attending the Dialysis unit in Ibn-Sina Hospital during the study period were included in the study.

Data collection
A verbal consent was obtained from each participant and especially designed questionnaire was filled out for each subject by direct interview. The data requested included age, sex, duration of hemodialysis, number of blood transfusion units.

Laboratory method use for diagnosis hepatitis B and C
Five ml of venous blood was obtained from each participant by veni-puncture; put it in dry plain tube then left at room temperature (20-25℃) to allow clot formation, then the sera were separated by centrifugation at 3000 rpm for 15 minutes, and divided into aliquots (250 µl) and stored at (-20℃) until examination .Testing of the serum samples of the patient was done by the commercially available third generation ELISA Anti HCV screening test were performed using Anti-HCV ELISA kit and HBsAg test were also performed using ELISA kit. The samples were considered positivewhen the sample absorbance/cut-off (SA/C)ratio was higher to 1.1 and negative when theSA/C ratio was <0.9 (values given by the manufacturer)

Statistical Analysis
Data were entered to a Word-Excel 2007 worksheet and data analysis was performed using Minitab Released 14 statistical software. Prevalence rate have been calculated in order to describe the characteristic of study population .Chi-square test was used to find the statistical association. P value below or equal to 0.05 was consider to be statistically significant.

Administrative agreements the official administrative agreement was obtained from MOH, DOH in Ninevah in addition to director of Continuous Medical Education in Mosul before conducting this study.

RESULTS

Two hundred sixtytwo patients on hemodialysis were tested. There were 154 (58.77%) males and 108(41.33%) females; their mean age (±SD) was 48.11 ±15.48 years (range 11-76 years). Seven of the 262 patients were HBsAg positive by ELISA corresponding to a 2.67% (7/262) (Table-5).

Seventeen of the 262 patients were anti-HCV positive by ELISA corresponding to a 6.49% (17/262)

Table 1: Prevalence of Anti HCV ELISA and HBsAg ELISA

Total number	. HBsAg ELISA		Anti HCV ELISA	
	Positive	Negative	Positive	Negative
262	7(2.67%)	255(97.32)	17(6.49%)	245(93.51)

The mean age of the seven HBsAg positive patients was nearby that of negative patients (40.29±15.35 vs. 48.11±15.48, p=0.810)

Table 2: Distribution of HBV infection in hemodialysis patients according to age.

Age (years)	Total no	HBsAg ELISA		P-value
		Positive (%)	Negative (%)	0.810
< 20	18	1(5.6)	17(94.4)	
20 -- 40	61	2(3.3)	59(96.7)	
40 --60	120	3(2.5)	117(97.5)	
≥ 60	63	1(1.6)	62(98.4)	
Total	262	7	255	

No significant statistical difference in HBsAg and Anti HCV was observed between males and females (5 vs. 2 ,p=0.680 and 11 vs. 6 ,p=0. 672 respectively) .

Table 3: show distribution of hemodialysis patients according to age and gender.

Gender	HBsAg ELISA		P value	Anti HCV ELISA		P value
	Positive (%)	Negative (%)	0.680	Positive	Negative	0.672
Male 154	5(3.2)	149(96.8)		11(7.1)	143(92.9)	
Female 108	2(1.9)	106(98.1)		6(5.6)	102(94.4)	
Total 262	7	255		17	245	

The prevalence of HBsAg and AntiHCV seropositivity (7/262, 2.67%; 17/262, 6.49% respectively) were significantly higher among patients who had longer duration of hemodialysis (p=0.001, p=0.001respectively).

Table 4: Distribution of HBV and HCV infection in hemodialysis patients according to duration of dialysis (DOD)

Variable	No. of patients	Mean DOD (months)	P value
HBsAg positive	7	47.71	0.001
AntiHCV positive	17	98.94	
Negative	238	27.84	

Table 5: Distribution of HBV and HCV infection in hemodialysis patients according to no. of blood units transfused

Variable	No. of patients	Mean No. of blood units transfused	P value
HBsAg positive	7	31.57	0.001
AntiHCV positive	17	38.94	
Negative	238	9.68	

4. DISCUSSION

The prevalence of HBV and HCV infections in HD patients and multi-transfused patients is related to the prevalence of the viruses in the community, the quality of healthcare services in a community and the standards of infection control practices in HD units.

The prevalence of those twotypes were studied in Iraq in 2005-2006 and it was found to be 1.7% and 0.4% respectively ([4].

This study revealed a low prevalence of HBV among HD patients (2.67%). It islower than rates that previously reported in Nineveh governorate in 2013 (18.4 %) [5].

This result was in agreement with other study in Kosovo for the decrease of HBV infection in dialysis patients as a result of advent of recombinant human erythropoietin and HBV vaccination in last years [6].

A study sample from the Dialysis Outcome and Practice Patterns Study that included 8615 adult HD patients from 308 dialysis facilities in Western Europe and the United States, reported prevalence rates for HBV infection ranging from 0% to 6.6% Studies from less developed countries (Brazil, India, Bahrain Saudi Arabia,and Kosovo) estimated that the proportion 9 of HBsAg carriers in the HD population varies from 2% to 20% [7].

Viral hepatitis remains a major hazard for both patients and medical staff of HD unitsin this study, the prevalence of HBV was lower than in other neighboring countries like Jordan (5.9%), Gaza strip, Palestine (8.1%) [8], Saudi Arabia (10%) and Bahrain (11.8%) and approximately similar to others such as inMorocco (2%) (9], and inIran (3%) [10]. On the other hand ,HBV infection remain concern in some countries, HBV infection outbreaks still remain a major problem a failure in control of nosocomial infection occurs[11], or due to contamination of dialysis machine with HBV and inappropriate sterilization of instrument using during the process of dialysis or the patients may be used immunosuppressive drugs or renal transplantation from infected donors with HBV, or transmitted the disease from health care worker staff by needles and instrument[12].

The HCV infection continues to be a major disease burden on the world. For example, the prevalence of HCV among dialysis patients has been reported to range from: 8 to 36% in North America, 39% in South America, 1 to 54% in Europe, 17 to 51% in Asia, 1.2 to 10% in New Zealand and Australia ([13].

The seroconversion and seroprevalence of HCV infection among dialysis patients is generally much higher than healthy blood donors, it ranges from 1 to >80% in different series [14], this wide difference may reflect the demographic variations among the general population in these countries, however, the dialysis process itself and the level of hygiene standards influence the prevalence of HCV infection [15].

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This study revealed a low prevalence of anti-HCV among HD patients (6.49%). It is lower than rates that previously reported in Baghdad (7.1) %[20], Al-Anbar governorate (11.7 %) , and lower than another results of studies conducted in Baghdad (39.5%),Nineveh (15.3%) and Basra (7.5%) [21]. This low prevalence of anti-HCV among HD patients may be due to the beneficial effect of isolating equipment for HCV positive patients which has been described by other studies [22] or may be due to decreased number of patients who attend this unit during the period of the study.

Thus strict application of infection control precautions including early screening of patients for anti-HCV and separate machines for anti-HCV positive patients lead to a decline in the incidence of seroconversion in HD unit [21].

Hemodialysis [HD] patients are at high risk for viral hepatitis infections due to the high number of blood transfusion session, prolonged vascular access and the potential for exposure to infected patients and contaminated equipment [20-21].

There was no statistical difference between male (56.5%) and female patients (43.5%) in the assessment of the prevalence rate of HBV(5 males vs. 2 females ,p=0.680) or HCV infection (11 males vs. 6 females, p=0.672) which was verified by other studies in Jordan , Pakistan and Sudan [22]. So no relationship was found between HBV or HCV prevalence and sex of the patients, this was in agreement with other studies by Lopes EP Otal [23].

Also there was no significant relationship between the prevalence rate of HBV or HCV infection and the age of the patients (40.29±15.23 vs. 48.38±15.48, p=0.810),(47.59±15.98 vs. 48.38±15.48, p=0.504) respectively, this finding is supported by other study by Lopes EP Otal [24].

There was significant relationship between the prevalence rate of HBV or HCV sero-positivity and theduration of hemodialysis (p=0.001) which has been noted in the current study which was compatible with the results of regional countries such as Iran and Jordan [25].

This is consistent with nosocomial transmission related to dialysis since longer duration of dialysis represents a longer period at risk of acquiring an infection. Similar observations have been reported by other authors in India and Romania [26].

Many patients with end stage renal disease need blood transfusion(s) for correction of anemia [27]. Blood transfusion(s) constitute a part of treatment in many HD patients and thus exposed greatly to HCV and HBV [115-117]. Blood transfusion is an important factor in the transmission of HCV and HBV infection; there was a positive relationship between blood transfusions and the risk of HCV and HBV infection (p=0.000) in this study. This risk increased with the increase in the number of blood units which were transfused. Similar results have been reported by other studies in Saudi Arabia, Lebanon and Taiwan [28] which also suggests that blood transfusion remains an important mode of exposure to HCV and HBV this result was also in agreement with other study in United States[29].

A limitation of thisstudy wasthat the patients did not test for the presence of HCV RNA (PCR) in their blood samples including anti-HCV negative patients. Relying on serological test alone, especially in patients, could underestimate the prevalence of HCV infected patients, as other workers have detected HCV RNA in 5% and 24% of their anti-HCV negative patients [30]. Long term hemodialysis patients may induce false-negative results as a result of an unstable immune response in up to 17.9% of patients tested [31]. The duration of the window period, the time between the onset of HCV infection and first detection of antibodies/antigens in the bloodstream, varies with the most commonly used generation of serology test from 66 days to only 4 days with the nucleic acid test (PCR) [32]. The PCR test has greater sensitivity for detecting HCV. Several high resourced countries since 1997 have used PCR as the routine screening test for blood donors [33]

CONCLUSION

This study has established that the prevalence of hepatitis B surface antigen (HBsAg) positivity and Hepatitis C Virus -specific antibody in hemodialysis patients in Mosul city , north of Iraq was lower than other middle east countries prevalence with lower prevalence of hepatitis B surface antigen (HBsAg) positivity than Hepatitis C Virus -specific antibody in hemodialysis patients and that duration of HD and number of transfused blood units are the main risk factors for HBV and HCV dissemination among HD patients.

RECOMMENDATION:

(1)The introduction of more accurate ways of detection of HCV infection cases, better screening of blood donors for HBsAg and HCVantibodies, hepatitis B vaccination and the use of recombinant erythropoietin in treating anemic patients, together with strict adherence to the universal infection control precautions are needed to decrease the prevalence of the infection among HD patients.

(2) In hemodialysis patients there is a greater likelihood of progression to chronicity and the occurrence of cirrhosis is also more frequent. Detection of HCV-RNA in serum and liver tissue through the use of RT-PCR is currently the most sensitive and specific method for detecting active infection. It overcomes two other problems:

A. The serological test cannot differentiate between acute and chronic infection and cannot detect evidence of infection during the window period (usually 6–10 weeks and occasionally up to 9 months) between acquiring infection and the detectable marker.
B. In addition, the existence of indeterminate results by the confirmatory serological test makes it more difficult for the researcher to give a clear definitive interpretation of the serological assay (135).

(3) Finally, until a vaccine against HCV becomes available, preventive measures such as blood donor screening using advanced techniques for detecting HCV infection before transfusion and strict infection control measures are crucial for the control of spread of HCV among these high-risk patients.

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