



Association between Renal Function and Patients with Chronic Hepatitis C Infection

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Objective: It has been reported that the hepatitis C virus (HCV) infection is associated with chronic kidney disease (CKD). In the present study we examined the association between clinical effect of chronic hepatitis C (CHC) and estimated glomerular filtration rate (eGFR) level in Taiwanese patients.

Methods: The 3360 patients with hepatitis C virus infection and 3360 age and sex matched community based control individuals without HCV were enrolled in this study between 2004 and 2016. We used Modification of Diet in Renal Diseases (MRDR) for calculate eGFR. Demographic and laboratory parameters were assessed and appropriate statistical methods were performed for the analysis.

Results: Multivariate logistic regression analysis revealed that serum GPT (OR-0.998; 95% CI – 0.997-0.999; $p=0.001$) level, platelet (OR-0.997; 95% CI – 0.995-0.999; $p=0.002$) count and hypertension (OR-1.31; 95% CI – 1.03-1.66; $p=0.027$) were significantly associated with HCV infected patients and serum TG (OR-1.001; 95% CI – 1.00-1.002; $p=0.005$) level, platelet (OR-0.996; 95% CI – 0.995-0.997; $p<0.001$) count, BMI>25 (OR-1.43; CI- 1.23-1.67; $p<0.001$), hyperlipidemia (OR- 1.32; CI-1.02-1.71; $p=0.035$), hypertension (OR-1.69; 95% CI – 1.42-1.99; $p<0.001$) and diabetes (OR-1.33; CI-1.03-1.71; $p=0.032$) were significantly associated with low eGFR (<90ml/min/m³) in control subjects. The BMI >25kg/m², hypertension, and diabetes were associated with low eGFR interaction with the HCV infection by multivariate analysis.

Conclusions: Our study indicated that the patients with HCV infection are associated with low eGFR compared with non HCV infected patients. The low eGFR was associated with obesity, hypertension and diabetes in patients with CHC.

Characteristics	HCV		Control		P for Interaction
	Adjusted OR (CI 95%)	P value	Adjusted OR (CI 95%)	P value	
BMI >25	-	-	1.43 (1.23-1.67)	<0.001	0.007
GOT	-	-	-	-	-
GPT	0.998 (0.997-0.999)	0.001	-	-	-
Platelet	0.997 (0.995-0.999)	0.002	0.996 (0.995-0.997)	<0.001	-
Triglycerides	-	-	1.001 (1.00-1.002)	0.005	-
Cholesterol	-	-	-	-	-
Hypertension	1.31 (1.03-1.66)	0.027	1.69(1.42- 1.99)	<0.001	0.020
Hyperlipidemia	-	-	1.32 (1.02-1.71)	0.035	0.002
Diabetes	-	-	1.33 (1.03-1.71)	0.032	0.031

Table 1. Multiple logistic regression analysis associated with eGFR <90 in HCV infected patients and control subjects. HCV-Hepatitis C virus, BMI-Body mass index, GOT-Glutamyl oxaloacetic transaminase, GPT-glutamyl pyruvic transaminase, eGFR-estimated glomerular filtration rate, OR- Odds Ratio, (CI 95%)- Confidence Interval.

HCV	Diabetes	eGFR<90	eGFR≥90	Adjusted OR (95% CI)	P value
		n, (%)	n, (%)		
-	-	1023 (39.5)	2032 (56.7)	1.00	
+	-	139 (5.4)	158 (4.4)	1.39 (1.09-1.79)	0.009
-	+	1168 (45.1)	1154 (32.2)	2.02 (1.67-2.44)	<0.001
+	+	259 (10.0)	238 (6.6)	1.82 (1.35-2.47)	<0.001
HCV Hypertension					
-	-	762 (34.0)	1735 (69.5)	1.00	
+	-	400 (17.8)	455 (13.8)	1.77 (1.50-2.09)	<0.001
-	+	734 (32.7)	826 (25.0)	1.79 (1.45-2.20)	<0.001
+	+	346 (15.4)	285 (8.6)	2.13 (1.63-2.77)	<0.001
HCV Hyperlipidemia					
-	-	1034 (50.7)	2036 (64.0)	1.00	
+	-	799 (39.2)	890 (28.0)	1.69 (1.39-2.06)	<0.001
-	+	128 (6.3)	154 (4.8)	1.37 (1.06-1.77)	0.016
+	+	78 (3.8)	103 (3.2)	1.33 (0.91-1.94)	0.144
HCV BMI>25					
-	-	594 (21.0)	1367 (35.7)	1.00	
+	-	567 (20.1)	812 (21.2)	1.48 (1.28-1.73)	<0.001
-	+	812 (28.7)	853 (22.3)	1.83 (1.47-2.29)	<0.001
+	+	854 (30.2)	800 (20.9)	2.01 (1.59-2.54)	<0.001

Table 2. Combined effects of HCV and risk factors associated with eGFR. SE- Standard error. Adjusted odds ratio (OR) with 95% confidence intervals (CIs) and their P-values were calculated after adjusted for GOT, GPT, PLT, TG, Cholesterol, Hypertension, Hyperlipidemia, and Diabetes by using the log regression model.

	N	eGFR mean (SD)	P value	P-trend	Post hoc test
HCV/DM					
-/-	3055	93.38 (13.95)	<0.001	<0.001	
+/-	2322	90.73 (27.25)			<0.001*
-/+	297	86.79 (23.85)			<0.001**
+/+	497	89.38 (26.19)			<0.001***
HCV/Hypertension					
-/-	2497	94.57 (13.27)	<0.001	<0.001	
+/-	1560	93.24 (25.85)			0.108*
-/+	855	87.63 (18.88)			<0.001**
+/+	631	85.54 (25.98)			<0.001***
HCV/BMI					
-/-	1961	93.77 (15.09)	<0.001	<0.001	<0.001***
+/-	1665	91.30 (28.11)			0.003*
-/+	1379	91.25 (14.94)			0.002**
+/+	1654	90.39 (26.17)			<0.001***

Table 3. Comparison of mean eGFR in HCV with diabetic, hypertension, hyperlipidemia and BMI groups. DM: diabetes, HCV: hepatitis C virus, eGFR: estimated glomerular filtration. P-trend was obtained by conducting general linear model with covariates adjustment. *(-) and (-) compared to (+) and (-) **(-) and (-) compared to (-) and (+) *** (-) and (-) compared to (+) and (+)