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## Original Research

### Assessment of correlation between renal dysfunction of severity of disease in patients with cirrhosis of liver: A clinical study

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#### ABSTRACT

**Background:** Hyperdynamic syndrome is a well-known clinical condition found in patients with cirrhosis and portal hypertension. Hence; under the light of above evidence, we planned the present study to analyze the correlation of renal dysfunction with severity of disease in liver cirrhosis patients. **Materials & methods:** The present study included assessment of correlation of renal dysfunction with severity of disease in liver cirrhosis patients. A total of 50 patients diagnosed with liver cirrhosis were included in the present study. Routine investigations in all the patients were carried out. Child Pugh Score Grading System was used for assessing the severity of disease in liver cirrhosis patients. Renal profile in all the patients was assessed and was correlated with the severity of disease as evaluated by Child- Pugh Score. All the results were compiled and analyzed by SPSS software. **Results:** 13 percent, 27 percent and 10 percent of the subjects were Grade A, B and C respectively. Serum Creatinine levels and blood urea were used as parameters for assessing the renal dysfunction. Raised levels of blood urea and serum Creatinine were found to be present in 12 patients. **Conclusion:** Significant correlation exists between the renal dysfunction and severity of disease in patients with cirrhosis of liver.

**Key words:** Cirrhosis, Liver, Renal

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## INTRODUCTION

Liver is an interesting organ with high regenerative capacity and complex functions. Liver fibrosis results from the perpetuation of the normal wound healing response resulting in an abnormal continuation of fibrogenesis (connective tissue production and deposition).<sup>1-3</sup> The etiology of cirrhosis can usually be identified by the patient's history combined with serologic and histologic evaluation. Hyperdynamic syndrome is a well-known clinical condition found in patients with cirrhosis and portal hypertension. Although the presence of cardiomyopathy in cirrhotic patients has been described since 1960s, it had been erroneously attributed to alcoholic cardiotoxicity.<sup>4</sup>

Only in the last 2 decades has it been shown that cardiac dysfunction is also present in nonalcoholic cirrhosis. Nitric oxide has been recognized as the most important vasodilator molecule in the splanchnic and systemic circulation of patients with cirrhosis. The clinical consequences of cirrhosis-related cardiovascular dysfunction are evident during and after Liver transplantation,

because the hemodynamic system is further compromised by the effect of anesthesia, mechanical ventilation, and surgical clamping, with a significant reduction in the cardiac output.<sup>5-7</sup> Various rhythm disturbances have been described in cirrhotic patients over the years including atrial fibrillation, atrial flutter, atrial and ventricular ectopy and ventricular arrhythmias.<sup>8-10</sup> Hence; under the light of above evidence, we planned the present study to analyze the correlation of renal dysfunction with severity of disease in liver cirrhosis patients.

## MATERIALS & METHODS

The present study was conducted in the department of Internal Medicine of the medical institute and it included assessment of correlation of renal dysfunction with severity of disease in liver cirrhosis patients. A total of 50 patients diagnosed with liver cirrhosis were included in the present study. Ethical approval was taken from the institutional ethical committee and written consent was obtained from all the patients after explaining in detail the

entire research protocol. Detailed demographic and clinical data of all the patients was obtained. Routine investigations in all the patients were carried out. Child Pugh Score Grading System was

used for assessing the severity of disease in liver cirrhosis patients.<sup>11</sup> Grading system according to Child Pugh score is shown in Table 1.

**Table 1: Child Pugh Score Grading System**

Factor	1 point	2 points	3 points
Total bilirubin (µmol/L)	<34	34-50	>50
Serum albumin (g/L)	>35	28-35	<28
PT INR	<1.7	1.71-2.30	>2.30
Ascites	None	Mild	Moderate to Severe
Hepatic encephalopathy	None	Grade I-II (or suppressed with medication)	Grade III-IV (or refractory)

Child Pugh Grading according to various parameters is as follows:

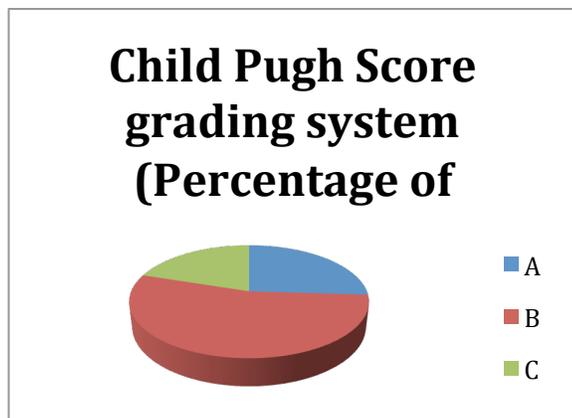
- Grade A: 5- 6 points
- Grade B: 7- 9 points
- Grade C: 10- 15 points

Renal profile in all the patients was assessed and was correlated with the severity of disease as evaluated by Child- Pugh Score. All the results were compiled and analyzed by SPSS software. Chi-square test and one- way ANOVA were used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

**RESULTS**

A total of 50 patients with cirrhosis of liver were studied in the present study. Mean age of the subjects of the present study was 48.5 years. Among these 50 subjects, 30 were males while the remaining 20 were females. Child-Pugh grading system was used for assessing the severity of cirrhosis of liver. According to his grading system, 13 percent, 27 percent and 10 percent of the subjects were Grade A, B and C respectively. Serum Creatinine levels and blood urea were used as parameters for assessing the renal dysfunction. Raised levels of blood urea and serum Creatinine were found to be present in 12 patients. Significant correlation was observed while assessing the distribution of patients according to Blood urea and serum Creatinine with severity of liver cirrhosis.

**Graph 1: Distribution of subjects according to severity of Child Pugh Score grading system**



**Table 2: Distribution of subjects according to Blood Urea levels**

Parameter	Frequency	Percentage
Blood urea	Normal	38
	Raised	12
	Total	50
Serum creatinine	Normal	38
	Raised	12
	Total	50

**Table 3: Distribution of patients according to Blood urea and severity of liver cirrhosis**

Blood urea	Child Pugh Score			Total	P-value
	A	B	C		
Normal	12	20	6	38	0.00*
Raised	1	7	4	12	
Total	13	27	10	50	

\*: Significant

**Table 4: Distribution of patients according to Serum Creatinine and severity of liver cirrhosis**

Serum Creatinine	Child Pugh Score			Total	P-value
	A	B	C		
Normal	12	20	6	38	0.00*
Raised	1	7	4	12	
Total	13	27	10	50	

\*: Significant

**DISCUSSION**

Renal dysfunction is a frequent complication in cirrhotic patients, occurring in one of every five inpatients with cirrhosis. Renal dysfunction in this population may present acutely, or may be a result of underlying chronic kidney disease (CKD). In any situation, it is associated with increased morbidity and mortality. In recent years, substantial progress has been made toward understanding the pathogenesis and natural history of renal failure in cirrhosis.<sup>12</sup> In the present study, a total of 50 patients with cirrhosis of liver were studied. Mean age of the subjects of the present study was 48.5 years. Among these 50 subjects, 30 were males while the remaining 20 were females. Child-Pugh grading system was used for assessing the severity of cirrhosis of liver. The prevalence of renal dysfunction was determined in one of the previous study. The medical records of cirrhotic patients who were admitted to Konkuk University Hospital between 2006 and 2010

were reviewed retrospectively. The data obtained at first admission were collected. Acute kidney injury (AKI) and chronic kidney disease (CKD) were defined using the proposed diagnostic criteria of kidney dysfunction in cirrhosis. Six hundred and forty-three patients were admitted, of whom 190 (29.5%), 273 (42.5%), and 180 (28.0%) were Child-Pugh class A, B, and C, respectively. Eighty-three patients (12.9%) were diagnosed with AKI, the most common cause for which was dehydration (30 patients). Three patients had hepatorenal syndrome type 1 and 26 patients had prerenal-type AKI caused by volume deficiency after variceal bleeding. In addition, 22 patients (3.4%) were diagnosed with CKD, 1 patient with hepatorenal syndrome type 2, and 3 patients (0.5%) with AKI on CKD. Both AKI and CKD are common among hospitalized cirrhotic patients, and often occur simultaneously (16.8%). The most common type of renal dysfunction was AKI (12.9%). Diagnosis of type 2 hepatorenal syndrome remains difficult.<sup>13</sup> In the present study, according to his grading system, 13 percent, 27 percent and 10 percent of the subjects were Grade A, B and C respectively. Serum Creatinine levels and blood urea were used as parameters for assessing the renal dysfunction. Raised levels of blood urea and serum Creatinine were found to be present in 12 patients. In another study the systemic hemodynamics, measured by Doppler-echocardiography, atrial natriuretic factor, plasma renin activity and plasma norepinephrine, was evaluated in 10 patients with cirrhosis and ascites and 10 healthy controls, after 2 h of standing and during lying down for a further 2 h. Standing hemodynamic patterns of controls and patients with cirrhosis did not differ significantly. The latter, however, showed higher plasma renin activity, norepinephrine and atrial natriuretic factor. The assumption of the supine position led to greater increases in cardiac index and atrial natriuretic factor, and reduction in systemic vascular resistance in patients with cirrhosis. Norepinephrine and plasma renin activity declined in both groups to a similar extent, while heart rate only slowed in controls. Thus, after 2 h in the supine position, patients with cirrhosis showed hyperdynamic circulation with increased cardiac index and heart rate and reduced systemic vascular resistance. Norepinephrine, plasma renin activity and atrial natriuretic factor were also elevated. The hyperdynamic circulation in advanced cirrhosis appears during or is enhanced by lying down. This finding suggested that this syndrome is, at least in part, attributable to excessive blood volume translocation towards the central area. However, the persistent activation of renin-angiotensin and sympathoadrenergic systems suggested that a concomitant reduced vascular sensitivity to vasoconstrictors concurs in its development.<sup>14</sup> In the present study, significant correlation was observed while assessing the distribution of patients according to Blood urea and serum Creatinine with severity of liver cirrhosis. In another study, authors conducted studies over 100 cirrhotic patients. The most common type of renal dysfunction was AKI (12%, 12/100) followed by HRS (7%, 7/100) and CKD (3%, 3/100). There is no significant association between the etiologies of cirrhosis and renal disorders ( $P = 0.25$ ). There is a significant increase in the number of renal disorder with increase in the severity of cirrhosis ( $P = 0.03$ ).<sup>15</sup>

## CONCLUSION

From the above obtained data, the authors conclude that significant correlation exists between the renal dysfunction and severity of

disease in patients with cirrhosis of liver. However; further studies are recommended.

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