

# Evolution and Survival of Cirrhotic Patients with Kidney Failure at the CHU Campus in Lomé

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## Abstract

**Background:** Renal failure in cirrhotic patients presents a significant complication that drastically affects survival rates, with factors like hepatorenal syndrome and other nephrotoxic conditions playing critical roles. **Objective:** To investigate the etiological and prognostic factors of renal failure in cirrhotic patients hospitalized in the Hepato-Gastroenterology department of the Lomé University Hospital Center, and to assess the survival of these cirrhotic patients with renal insufficiency. **Patients and Methods:** Descriptive and analytical study conducted over 5 years (January 1, 2013 to December 31, 2017). Included were cirrhotic patients who had at least one serum creatinine value during hospitalization. Renal impairment was defined as a glomerular filtration rate (GFR) estimated by creatinine clearance  $<60$  ml/min/1.73 m<sup>2</sup>. The statistical analysis was done with the R Studio software version 3.3.2. **Results:** A total of 210 patients were retained. Renal failure was found in 63 patients, with a prevalence of 30% [95% CI; 23.99% to 36.76%]. The sex ratio H/F was 0.46. The average age was  $48.00 \pm 14.36$  years (range 18 - 95 years). Viral hepatitis B was predominant (40% of cases). Univariate and multivariate analysis showed that renal failure was associated with age  $> 46$  years ( $p = 0.0035$ ), ascites ( $p < 0.0001$ ); hepatic encephalopathy stage 3 ( $p = 0.0091$ ); the Child C score ( $p < 0.0001$ ); arterial hypertension ( $p = 0.0017$ ), hyperkalemia ( $p = 0.0096$ ); and diuretics ( $p = 0.0039$ ). Cirrhotic patients with renal failure required more blood transfusion than non-renal failure patients ( $p = 0.0047$ ). On the seventh day of hospitalization, the probability of survival in patients with renal impairment was 0.683 [CI% 0.5690 - 0.821] versus 0.944 [CI 0.905 - 0.985] for non-renal failure patients ( $p < 0.0001$ ). **Conclusion:** Etiologic and prognostic factors of renal failure in cirrhotic patients were age, ascites, hepatic encephalopathy stage 3, hypertension, hyperkalemia, diuretics, blood

transfusion, and CHILD C. These patients have a decrease in their survival of 26.1% compared to those who do not have renal insufficiency. This makes kidney failure a prognostic factor for cirrhosis.

## Keywords

Togo, Survival, Renal Failure, Hepatic Cirrhosis, Etiological and Prognostic Factors

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## 1. Introduction

Cirrhosis, histologically defined by a mutilating fibrosis of the liver and the formation of nodules of regeneration, poses a significant public health challenge globally, including in Africa. This condition is often diagnosed at advanced stages characterized by various complications such as ascites, ascitic fluid infection, digestive hemorrhage, hepatic encephalopathy, hepatocellular carcinoma (HCC), and hepatorenal syndrome [1] [2].

Among the myriad complications, renal failure emerges as a frequent occurrence, affecting over 50% of cirrhotic patients [3]. Renal failure in cirrhosis can manifest as either acute or chronic and is often associated with a poor prognosis, significantly elevating mortality rates [4]. Additionally, renal impairment can occur independently of other complications, notably in the form of chronic kidney disease (CKD) [5].

In the early 2000s, the Model for End-Stage Liver Disease (MELD) emerged as a more objective prognostic tool compared to the Child-Pugh score, integrating three variables, including creatinine, as a marker of renal function [6]. The presence of renal failure, whether acute or chronic, exacerbates the prognosis for cirrhotic patients, emphasizing the critical importance of accurately assessing glomerular filtration rate (GFR) in therapeutic management [6]. This assessment facilitates early detection of renal dysfunction, ensures appropriate drug dosing, minimizes adverse effects, and informs timely therapeutic interventions such as double liver-kidney transplantation.

In contexts where liver transplantation is not readily accessible, preventive measures against renal failure become paramount, given the exorbitant direct costs associated with its treatment. This challenge is particularly stark in environments characterized by low socioeconomic status, as underscored by studies conducted by SABI *et al.* [7] and LAWSON *et al.* [8]. Thus, the primary objective of this study is to identify the determinants of renal failure in cirrhotic patients and to evaluate the progression and survival outcomes of cirrhotic patients afflicted with renal failure.

## 2. Methodology

This was a retrospective descriptive and analytical cross-sectional study, from

January 1, 2013 to December 31, 2017, a period of 5 years, covering the records of cirrhotic patients hospitalized in the hepato-gastroenterology department of the CHU Campus de Lomé.

All patients over 15 years of age, regardless of sex, hospitalized in the Hepato-Gastroenterology Department for cirrhosis and its complications, and who had compulsory creatinemia during hospitalization, were included in this study. All patients under 15 years of age who did not have a renal assessment were excluded from our study. Data from the records of included patients were recorded on a specially designed survey form. All outliers in creatinine levels (below 3 mg/l) were eliminated. The parameters studied were sociodemographic data (age, sex, occupation, income level, marital status), etiological factors and prognostic and evolutionary data based on the Child-Pugh classification. Renal failure is defined independently of its character by an estimated Glomerular Filtration Rate below 60 ml/min/1.73 m<sup>2</sup>. The estimated glomerular filtration rate was obtained by calculating creatinine clearance using the simplified MDRD (Modification of Diet in Renal Diseases) formula.

The statistical tests used were Pearson's Chi-square test or Fisher's exact test for qualitative variables, and Student's t-test for quantitative variables. The significance threshold was set at 0.05. Univariate and multivariate logistic regression was performed to search for associated factors. The dependent variable was eGFR status, coded 1 if eGFR <60 and 0 if not. The Kaplan-Meier curve was plotted to assess patient survival. Log Rank was used to compare the survival curves of cirrhotic patients with and without renal failure.

From an ethical point of view, patient anonymity was preserved.

### 3. Results

A total of 388 patients were registered during the study period for cirrhosis and its complications. Among them, 210 (54.12%) patients had at least one creatinemia performed during the hospitalization period. Renal failure defined as GFR below 60 ml/min/1.73 m<sup>2</sup> was found in 63 patients, a prevalence of 30% [95% CI 23.99% - 36.76%]. Males predominated, with an F/H sex ratio of 2.17, and the mean age of patients was 48.00 ± 14.36 years (extremes 18-95 years, median age 46 years), as shown in **Table 1**.

Subjects with renal failure had the highest severity scores (38.71% Child B and 41.94% Child C) than subjects without renal failure (29.93% Child B and 20.41% Child C) ( $p < 0.0001$ ). They also had a higher in-hospital mortality rate (63.5% vs. 23.6%) ( $p < 0.0001$ ), as shown in **Table 2**. In both univariate and multivariate analyses, subjects with IR had a 6-fold higher risk of death than those without IR, with  $p < 0.0001$ , as shown in **Table 3**.

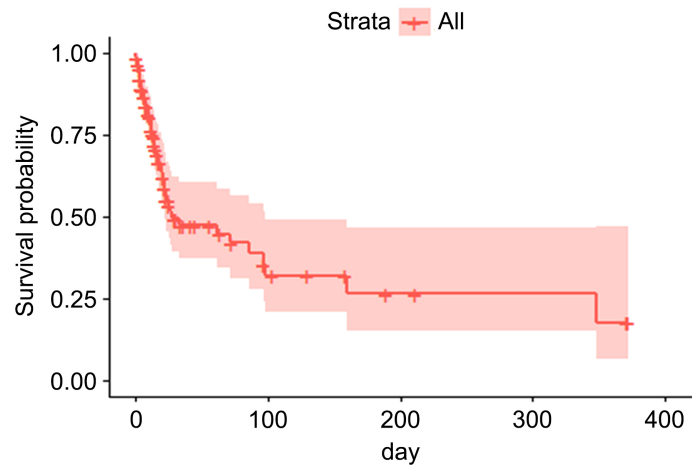
The probability of survival for patients enrolled in our study is shown in **Figure 1**. On the seventh day of hospitalization, the probability of survival for cirrhotic patients was 0.866 [95% CI 0.817 - 0.917]. The probability of survival after 6 months was 25% for patients with renal failure versus 45% for patients without

renal failure ( $p < 0.0001$ ). On the seventh day of hospitalization, the probability of survival for patients with renal failure was 0.683 [CI% 0.5690 - 0.821] versus 0.944 for patients without renal failure [CI 0.905 - 0.985] with ( $p < 0.0001$ ) as shown in **Figure 2**.

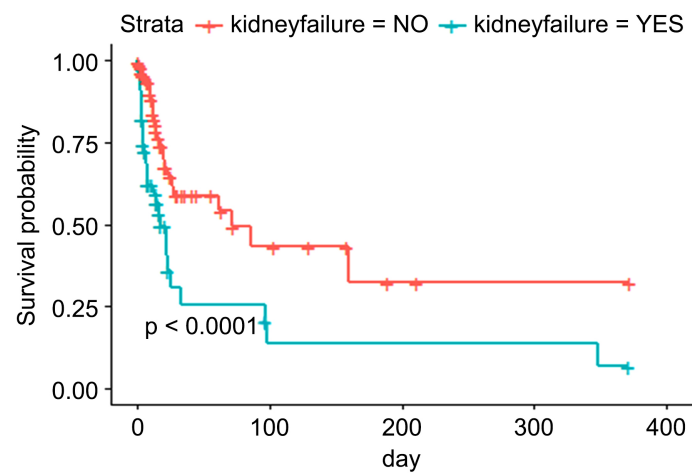
**Table 1.** General characteristics of the population.

	Overall (N = 63)	
	Number	(%)
Sex		
Male	38	60.32
Female	25	39.68
Medianage (Years)		
≤46	23	36.51
>46	40	63.49
Marital status		
Single	6	9.52
Married	44	69.84
Cohabiting	13	20.63
Income		
Low	25	39.68
Medium	33	52.38
High	5	7.94
Profession		
Privatesector	11	17.46
Publicsector	11	17.46
Unemployed/Student	21	33.33
Informal	20	31.75
Etiological		
Alcohol	9	14.29
HBV	30	47.62
HCV	8	22.22
Hepatotoxic Drugs	5	12.7

HBV: viral hepatitis B; HCV: viral hepatitis C.



**Figure 1.** Probability of survival for cirrhotic patients.



**Figure 2.** Probability of patient survival after 6 months of evolution.

**Table 2.** Progression and prognosis of renal failure.

	IR-		IR+		Total		P
	(N = 147)		(N = 63)		(N = 210)		
	N	(%)	N	(%)	N	(%)	
CHILD-PUGH Score							<0.0001
A	73	49.66	12	19.35	85	40.67	
B	44	29.93	24	38.71	68	32.54	
C	30	20.41	26	41.94	56	26.79	
Evolution							<0.0001
Deaths	34	23.61	40	63.49	74	35.75	
Stabilization	89	61.81	18	28.57	107	51.69	
Escape	21	14.58	4	6.35	25	12.08	
Transfer	0	0	1	1.59	1	0.48	

IR- = Absence of renal failure; IR+ = Presence of renal failure.

**Table 3.** Evolutionary characteristics.

	Univariate model				
	n/N	%	RC	IC à 95%	p-Values
CHILD PUGH score					
A	12/85	14.12	1		0.0028
B	24/68	35.29	3.32	[1.53 - 7.50]	<0.0001
C	26/56	46.43	5.27	[2.40 - 12.15]	<0.0001
Evolution					
Deaths	40/74	54.05	1		<0.0001
Stabilization	18/107	16.82	0.17	[0.08 - 0.33]	<0.0001
Escape/transfer	05/26	19.23	0.2	[0.06 - 0.56]	0.0036

#### 4. Discussion

The prevalence of IR in our series was 30%. This prevalence is compatible with that of the literature, which ranged from 20% to 50% [9]-[11].

Renal failure is a prognostic factor in cirrhosis [12]. In this study, the probability of survival on the 7th day of hospitalization in cirrhotic patients without renal insufficiency fell from 94.4% to 68.3% with renal insufficiency; A decrease of 26.1%, significantly  $p < 0.0001$ . In several studies using GFR or creatinine elevation, we note that renal failure leads to excess mortality in the cirrhotic population. Even a modest increase in creatinine ( $\geq 26.5 \mu\text{mol/l}$ ) is associated with increased mortality Fede *et al.* showed that, in a systematized analysis of reviews of renal failure and cirrhosis, renal failure was a prognostic factor correlated with death in over thirty studies [13] [14]. They found that death was 65% in cirrhotics with IR versus 25% in cirrhotics without IR; The risk was 7.6 (CI 95%; 5.4 - 10.8) with  $p < 0.001$ . Median mortality in these studies was 67% and this increased with rising creatinine. Qureshi *et al.* [15] found similar data, with mortality significantly associated with IR (IR: 31% vs. without IR: 4.5%)  $p < 0.001$ ; Wu *et al.* found an even greater difference (IR: 72.4% vs. without IR: 13.3% with  $p < 0.001$ ) [12] [13]. Hung *et al.* demonstrated that with IR, the survival of cirrhotic patients with hepatic encephalopathy was reduced independently of hepatic encephalopathy, which is itself an unfavorable prognostic factor [16]-[18]. Mortality increased from 16.4% without IR to 36.6% with IR within 30 days  $p < 0.0001$ .

We could explain this by the fact that renal failure occurred at the advanced stage of cirrhosis when other prognostic factors for mortality were also noted, such as hepatic encephalopathy, hyponatremia, digestive haemorrhage [13]-[15]. In a review of studies of prognostic factors associated with death in cirrhosis, Infante-Rivard *et al.* found that the most significant prognostic parameters were age, sex, hepatic encephalopathy and prothrombin level, irrespective of the cause of cirrhosis [19] [20]. In our study, some of these parameters were significantly

associated with the presence of renal failure. There is also a high risk of hydroelectrolytic disorders, including hyperkalemia, which is known to be associated with renal failure and which is a major cause of death in these patients [21].

The study has several limitations that affect its generalizability and relevance. Firstly, it is based on data from a single center, which might not reflect conditions or treatments in other regions in Togo. Additionally, the inclusion criteria might introduce selection bias as it only considers patients with recorded serum creatinine values, potentially excluding a subset of relevant cases. Lastly, the time gap between the end of data collection in 2017 and publication could mean that the findings do not account for recent advances in medical practices or treatments, reducing their applicability to current clinical scenarios. These factors don't reduce the strength of this type of study which is the first one in Togo. In recent years, the focus has been on tackling social disparities in health in Togo with the introduction of universal health insurance. The publication of this study makes a direct contribution to this urgent dialogue, providing timely data that can influence health policy and resource allocation in regions where healthcare needs are high.

## 5. Conclusion

Renal failure is a frequent complication of advanced cirrhosis, but above all a factor in the severity of this pathology, making it important to assess renal function in the management of cirrhotic patients, as well as in the evaluation of their prognosis. For the latter, the MELD score is of particular interest in cirrhotic patients. Strict precautions must be taken in cirrhotic patients to reduce the risk of renal failure and its associated complications.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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