ORIGINAL ARTICLE

Study of Overall Survival and Factors Affecting Outcomes in Chronic Hepatitis C Patients Undergoing Liver Transplantation: A Single-centered Cohort Study

Chitchai Rattananukrom, MD[1], Kongpob Yongrattanakit, MD[1], Tanita Suttichaimongkol, MD[1], Witsarut Manasirisuk, MD[1], Kookwan Sawadpanich, MD[1], Apichart Sangchan, MD[2], Kawin Tangworapongchai, MD[2], Pisaln Mairiang, MD[2], Wattana Sukeepaisarnjareon, MD[1]

[1] Division of Gastroenterology and Hepatology, Department of Medicine, Faculty of Medicine Srinagarind Hospital, Khon Kaen University, Khon Kaen, Thailand

[2] Center of Excellence, Division of Gastroenterology and Hepatology, Department of Medicine, Faculty of Medicine, Srinagarind Hospital, Khon Kaen University, Khon Kaen, Thailand

Background: Chronic hepatitis C virus (HCV) infection is a significant global health concern, including in Thailand. It can lead to progressive liver diseases such as cirrhosis and hepatocellular carcinoma (HCC). Liver transplantation (LT) is recognized as the curative treatment for early-stage HCC and decompensated cirrhosis. However, LT recipients with chronic HCV infection tend to have lower survival rates compared to those with other indications, with graft failure due to HCV recurrence and HCC development being the primary causes of mortality. While studies in Western countries have explored various factors influencing outcomes, including HCC, similar research is lacking in Asia and particularly in Thailand.

Objective: The present study aims to fill this gap by examining overall survival and factors affecting outcomes in chronic hepatitis C patients undergoing liver transplantation at Srinagarind Hospital.

Materials and Methods: A retrospective cohort study was conducted. The 16-year period, medical records of adult liver transplant recipients with HCV infection, transplanted between January 2008 and May 2023, were systematically reviewed. Recipients with only anti-HCV positive and lacking confirmation of HCV viral load before transplantation were excluded. Patient medical records were meticulously abstracted to gather information, including the overall survival of LT recipients with chronic HCV infection. Survival curves were generated using the Kaplan-Meier method and compared using the log-rank test. Univariate Cox proportional hazard models were employed to calculate hazard ratios for variables associated with death. The primary outcome was the overall survival of LT recipients with chronic HCV infection and secondary outcomes were factors affecting overall survival, the rate of HCV recurrence, cirrhosis recurrence, and HCC recurrence.

Results: The medical records of 81 adult liver transplantation recipients with chronic hepatitis C transplanted at Srinagarind Hospital. HCV recurrence was observed in nearly all cases (98.6%) where HCV viral load was detectable prior to liver transplantation. Subsequently, approximately 72% of patients underwent HCV treatment after LT, with a 100% success rate in achieving sustained virological response (SVR) among those treated. At the last follow-up, 76.8% of patients were SVR. Cirrhosis recurrence occurred in 4.9% of cases, while HCC recurrence was noted in 7.4% of cases. The 5-year overall survival rate for liver transplant recipients was 75.3%. For factors affecting patient outcomes, HCC recurrence (HR=26.55; 95% CI=5.14 to 137.21; p<0.001) and cirrhosis recurrence (HR=9.05; 95% CI=1.79 to 45.87; p=0.008) were also found to be correlated with an increased risk of mortality. On the other hand, both HCV treatment after LT (HR=0.09; 95% CI=0.03 to 0.3; p<0.001) and achieving SVR status at the final follow-up visit (HR=0.13; 95% CI=0.05 to 0.35; p<0.001) were significantly associated with a reduced risk of death.

Conclusion: Over the 16-year period, the 5-year overall survival rate for liver transplant recipients with chronic HCV infection was 75.3%. The recurrence of HCC and cirrhosis were the significant risk factors for reducing overall survival. Conversely, LT patients who underwent HCV treatment and achieved SVR status at the final follow-up visit demonstrated a good factor to improve overall survival.

Keywords: Chronic hepatitis C (HCV); Liver transplantation; Overall survival; HCV recurrence after liver transplantation; Hepatocellular carcinoma (HCC) recurrence after liver transplantation; Cirrhosis recurrence after liver transplantation; HCV treatment; Sustained virological response (SVR); Thailand

Received 17 January 2025 | Revised 24 February 2025 | Accepted 3 March 2025

J Med Assoc Thai 2025;108(Suppl.2):S28-36

Website: http://www.jmatonline.com

Correspondence to:

Rattananukrom C.

Division of Gastroenterology and Hepatology, Department of Medicine, Faculty of Medicine, Srinagarind Hospital, Khon Kaen University, Khon Kaen 40002, Thailand.

Phone: +66-43-363746

Email: Chitra@kku.ac.th

How to cite this article:

Rattananukrom C, Yongrattanakit K, Suttichaimongkol T, Manasirisuk W, Sawadpanich K, Sangchan A, Tangworapongchai K, Mairiang P, Sukeepaisarnjareon W. Study of Overall Survival and Factors Affecting Outcomes in Chronic Hepatitis C Patients Undergoing Liver Transplantation: A Single-centered Cohort Study. J Med Assoc Thai 2025(Suppl.2):S28-36.

DOI: 10.35755/jmedassocthai.2025.S02.S28-S36

Chronic hepatitis C virus (HCV) infection represents a significant global health challenge, with an estimated prevalence of 1.8%, affecting approximately 130 to 150 million people worldwide. In Thailand, the prevalence is lower at 0.39%, with the northeastern region exhibiting the highest prevalence at 0.89%[1,2]. Chronic HCV infection is still problematic and leads to progressive liver diseases, including cirrhosis and hepatocellular carcinoma (HCC). Liver transplantation (LT) is considered the optimal treatment for early-stage HCC and/or decompensated cirrhosis. According to the Thailand organ transplant report from 2016 to 2022, HCC was the primary indication for LT, with HCV cirrhosis being the second most common cause of HCC. Additionally, decompensated cirrhosis, with HCV as the third leading cause, was a frequent indication for liver transplantation[3].

LT recipients with chronic HCV infection have reported the 5-year survival rates ranging from 60% to 80%[4,5], which is lower compared to other indications for LT[6]. Graft failure from persistent HCV infection and HCC are the primary causes of mortality in this population[5]. Liver transplant recipients with chronic HCV infection who did not receive HCV eradication therapy prior to the liver transplantation continued to exhibit HCV recurrence in post-transplantation period[7,8]. 20 to 40% of those who remain untreated for HCV infection after LT often experience liver injury, with approximately 10 to 20% of infected recipients developing cirrhosis within 5 years post-transplantation[4,5,8-14].

Several studies have shown that post-LT patients with HCV recurrence are affected by multiple factors influencing their outcomes, such as the immunosuppressive regimens, HCV viral load level before transplantation, HCV genotype, and the age of the donor[4,5,10,11]. Moreover, HCC also significantly impacts the survival of LT recipients with HCV infection, with HCC patients demonstrating lower survival rates compared to those without HCC at both 3 and 5 years[11].

However, while previous studies have been conducted mainly in Western countries, research from the Eastern world, especially Thailand, remains limited. Srinagarind Hospital, Khon Kaen University is one of the well-known transplantation center in Thailand. Nowadays, Srinagarind hospital has been noted for having the highest number of adult liver transplantation cases in Thailand over the past 7 years, with 35.4% of recipients being infected with HCV. However, there is still no report available on the survival rate among LT patients with HCV infection. Therefore, the author aims to investigate overall survival and factors affecting outcomes in chronic hepatitis C patients undergoing liver transplantation at Srinagarind Hospital.

Materials and Methods

This retrospective cohort study was conducted after obtaining approval from the Center for Ethics in Human Research, Khon Kaen University: HE661573. The present study was performed in accordance with the committee's guideline. The medical records of adult liver transplant recipients with HCV infection, transplanted between January 2008 and May 2023, were systematically reviewed. Recipients with only anti-HCV positive and lacking confirmation of HCV viral load before transplantation were excluded. Diagnosis of HCV infection relied on detectable HCV RNA or HCV viral load, while HCC diagnosis was based on cross-sectional imaging. In the post-LT period, HCV recurrence was defined as the detection of HCV RNA after liver transplantation. HCC recurrence was identified through cross-sectional imaging, while cirrhosis recurrence was assessed using ultrasound, cross-sectional imaging, or fibroscan post-LT.

Patient medical records were meticulously abstracted to gather demographic information, age of liver donor, laboratory results at LT date (including complete blood count, serum creatinine, prothrombin time, INR, liver function tests, AFP), HCV RNA levels before and after LT, HCV genotype, MELD-Na score at LT, HCC status, BCLC staging of HCC, HCV treatment status before LT, HCV SVR status at the last follow-up, date of LT, date of HCV recurrence, HCV recurrence treatment, date of HCV SVR, death date, and date of last follow-up.

Overall survival was determined and calculated. Additionally, the time intervals between liver transplantation and each outcome were calculated based on the date differences.

The primary outcome was the overall survival of LT recipients with chronic HCV infection, and secondary outcomes were included factors affecting overall survival, the rate of HCV recurrence, cirrhosis recurrence, and HCC recurrence.

Statistical analysis

Demographic data, characteristics, and outcomes were summarized using descriptive statistics. Student's t-test, Mann-Whitney U test, and Chi-square test were employed for comparisons. Survival curves were generated using the Kaplan-Meier method and compared using the log-rank test. Univariate Cox proportional hazard models were utilized to calculate hazard ratios for variables associated with death. A significance level of $p<0.05$ was considered statistically significant. Statistical analyses were performed using BlueSky Statistics software version 7.40 (BlueSky Statistics LLC, Chicago, IL, USA).

Results

During the 16-year observational period, a cohort of 81 adult liver transplant recipients with chronic HCV infection was identified (Table 1). The majority of these individuals, around 90%, were male. At the time of liver transplantation, the median age was 54.8 years (range: 35.1 to 65 years), with a corresponding median body mass index (BMI) of 24.3 kg/m² (range: 15.8 to 33.7 kg/m²). Child-Pugh classification at transplantation revealed distribution among classes A, B, and C, accounting for 54.3%, 38.3%, and 7.4%, respectively. Nearly all patients were diagnosed with cirrhosis. Hepatocellular carcinoma (HCC) was present in 66.7% of cases, with BCLC staging proportions of 81.5%, 14.8%, and 3.7% for stages A, B, and C, respectively.

The median serum Alpha-fetoprotein (AFP) level at the time of liver transplantation was 28.7 ng/ml (range: 1.6 to 1,174 ng/ml). The prevalence rates of diabetes mellitus and hypertension were approximately 50% each, while chronic HBV infection and chronic kidney disease were less frequent, affecting only 3.7% and 8.5% of patients, respectively. The median Model for End-Stage Liver Disease-Na (MELD-Na) score was 13 (range: 7 to 33).

Regarding HCV genotypes, three genotypes were identified, with genotype 3 being the most common at 48.1%, followed by genotype 1 at 36.5% and genotype 6 at 15.4%. Prior to liver transplantation, only 28.4% of patients received HCV eradication therapy.

The median age of the donors was 37.0 years, (range: 7 to 59 years). The predominant immunosuppressive regimens consisted of tacrolimus, mycophenolic acid, and

Table 1. Demographic and clinical characteristics of 81 adult liver transplantation recipient with chronic hepatitis C infection

Variables	n=81
Male, n (%)	72 (87.8%)
Age at liver transplantation, year (range)	54.8 (35.1, 65.0)
BMI at liver transplantation, kg/m² (range)	24.3 (15.8, 33.7)
Child-Pugh class at liver transplantation, n (%)	
A	43 (53.7%)
B	32 (39.0%)
C	6 (7.3%)
Cirrhosis status, n (%)	81 (100%)
HCC status, n (%)	54 (65.9%)
HCC BCLC stage, (%)	
A	81.5%
B	14.8%
C	3.7%
Serum AFP at liver transplantation, ng/ml (range)	28.7 (1.6, 1,174.0)
HBV infection status, n (%)	3 (3.7%)
Diabetes mellitus, n (%)	40 (48.8%)
Hypertension, n (%)	45 (54.9%)
Chronic kidney disease, n (%)	7 (8.5%)
MELD-Na score at liver transplantation (range)	13.0 (7.0, 33.0)
Serum creatinine at liver transplantation (range)	0.9 (0.6, 10.9)
Platelet at liver transplantation (range)	82,000.0 (23,000.0, 304,000.0)
Albumin at liver transplantation (range)	3.2 (1.8, 4.7)
INR at liver transplantation (range)	1.3 (0.9, 2.2)
Waiting time for liver transplantation, day (range)	109.5 (14.0, 1,554.0)
HCV viral load at liver transplantation, IU/ml (range)	603,772.0 (0.0, 28,300,000.0)
HCV genotype, %	
1	36.5%
3	48.1%
6	15.4%
HCV treatment prior to liver transplantation, n (%)	21 (28.4%)

Results are shown as median (range) unless otherwise indicated.

BMI=Body mass index; HCC=Hepatocellular carcinoma; BCLC=Barcelona clínic liver cancer; AFP=Alpha-fetoprotein; HBV=Hepatitis B virus; INR=International normalized ratio; HCV=Hepatitis C virus

prednisolone, accounting for 92.6% of cases. Alternative regimens included tacrolimus, mycophenolate mofetil, prednisolone (4.9%), and mycophenolic acid, cyclosporine, prednisolone (2.5%).

In the post-LT period (Table 2), HCV recurrence was detected in nearly all cases (98.6%) where HCV RNA was detectable prior to liver transplantation. The median duration from transplantation to HCV recurrence was 131 days (range: 2 to 2,067 days). HCV RNA level was higher than the pre-LT period. Following HCV recurrence, about 72.1% of patients underwent HCV recurrence treatment. The median duration from transplantation to HCV recurrence treatment was 495 days (range: 0 to 3,737 days). The most common regimens were Sofosbuvir/Velpatasvir (69.4%), followed by Sofosbuvir/Velpatasvir and Ribavirin (12.2%), and Pegylated interferon and Ribavirin (12.2%). A smaller proportion of LT patients received Sofosbuvir/Ledipasvir (2%). Among those who treated, 100% achieved sustained virological response (SVR).

At the last follow-up, 76.8% of patients had SVR, while 22.3% remained infected. Cirrhosis recurrence was observed in 4.9% of cases, with a median duration of 1,825.5 days from transplantation (range: 1,568 to 3,104 days). HCC recurrence occurred in 7.4% of cases, with a median duration of 203 days (range: 80 to 766 days).

The median duration from transplantation to the last follow-up visit was 4.8 years, (range: 0.2 to 13.3 years). Twenty patients (24.7%) were deceased by the end of the study period. The 5-year overall survival for adult liver transplant recipient with chronic HCV infection was 75.3% (Figure 1).

For the overall survival rates of patients stratified by their sustained virologic response (SVR) status at the final follow-up visit (Figure 2), patients who achieved SVR exhibited high survival rates, with 1-, 3-, and 5-year survival rates of 98.2% (95% CI, 94.6% to 100%), 96% (95% CI, 90.7% to 100%), and 93.6% (95% CI, 86.8% to 100%), respectively. In contrast, patients who did not achieve SVR had lower survival rates, with 1-, 3-, and 5-year survival rates of 87.5% (95% CI, 72.7% to 100%), 63.6% (95% CI, 42.4% to 95.6%), and 47.7% (95% CI, 27% to 84.4%), respectively.

For the overall survival rates of patients categorized by their hepatocellular carcinoma (HCC) recurrence status (Figure 3), patients experiencing HCC recurrence demonstrated 1- and 3-year survival rates of 75% (95% CI, 42.6% to 100%) and 0%, respectively. Conversely, patients

Table 2. Overview of post-liver transplantation outcomes and management strategies

Variables	n=81
Median donor age, year (range)	37.0 (7.0, 59.0)
Immunosuppressive regimen	
Tacrolimus, Mycophenolic acid, Prednisolone	75 (92.7%)
Tacrolimus, Mycophenolate mofetil, Prednisolone	4 (4.9%)
Mycophenolic acid, Cyclosporine, Prednisolone	2 (2.4%)
HCV recurrence after liver transplantation, n (%) (*n=80, missing data=1)	80 (98.6%)
Median duration from liver transplantation to HCV persistent, days (range)	131.0 (2.0, 2,067.0)
Median HCV viral load at HCV recurrence detection (range)	4,865,611.0 (4,162.0, 100,000,000.0)
HCV retreatment, n (%) (*n=68)	49* (72.1%)
Median duration from liver transplantation to HCV retreatment, days (range)	495.0 (0.0, 3,737.0)
HCV retreatment regimen, (%)	
Sofosbuvir/Velpatasvir	69.4%
Sofosbuvir/Velpatasvir and Ribavirin	12.2%
Pegylated interferon and Ribavirin	12.2%
Sofosbuvir/Ledipasvir	2%
HCV treatment response (SVR), n (%) (*n=43, missing data=7)	43* (100%)
HCV status at last follow-up visit, n (%) (*n=69, missing data=12)	53* (76.8%)
Median duration from liver transplantation to SVR, day (range)	1,546.0 (199.0, 3,793.0)
Cirrhosis recurrence, n (%)	4 94.9%)
Median duration from liver transplantation to cirrhosis recurrence, days (range)	1,825.5 (1,568.0, 3,104.0)
HCC recurrence, n (%)	4 (7.4%)
Median duration from liver transplantation to HCC recurrence, days (range)	203.0 (80.0, 766.0)
Median duration from liver transplantation to last follow-up, years (range)	4.8 (0.2, 13.3)
Dead, n (%)	20 (24.7%)

HCV=Hepatitis C virus; SVR=Sustained virologic response; HCC=Hepatocellular carcinoma

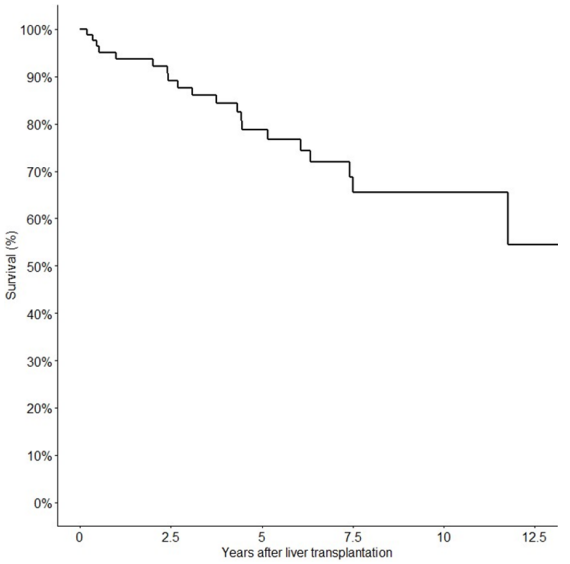

Figure 1. Kaplan-Meier curve presents the overall survival outcomes among 81 liver transplant recipients with HCV infection.

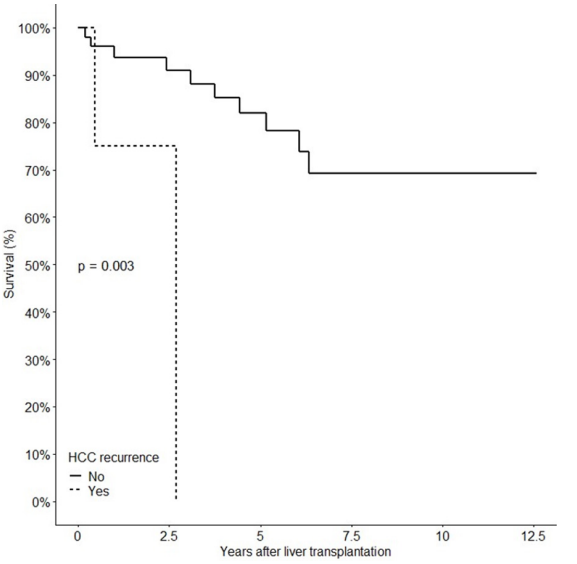

Figure 3. Univariate Cox regression analysis graph depicts the overall survival rates of patients categorized by their hepatocellular carcinoma (HCC) recurrence status.

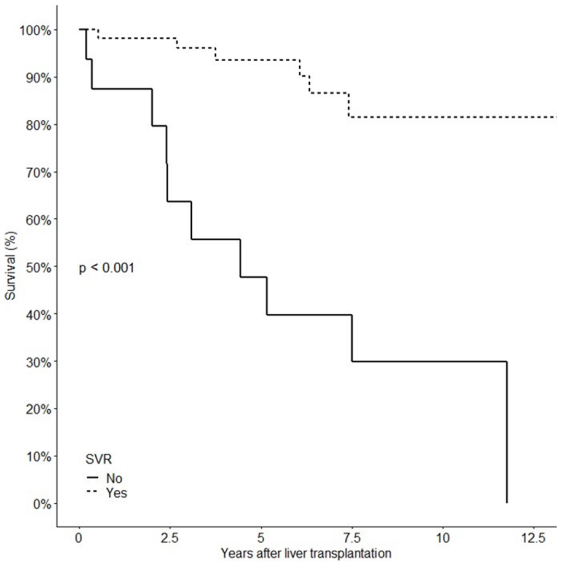

Figure 2. Univariate Cox regression analysis graph illustrates the overall survival rates of patients stratified by their sustained virologic response (SVR) status at the final follow-up visit.

without HCC recurrence exhibited 1-, 3-, and 5-year survival rates of 93.7% (95% CI, 86.9% to 100%), 91% (95% CI, 82.9% to 99.9%), and 81.9% (95% CI, 70.4% to 95.3%), respectively.

To define factors affecting outcomes, Cox proportional regression analysis indicated that HCV treatment after LT (hazard ratio [HR], 0.09; 95% CI, 0.03 to 0.3; p<0.001) and achieving SVR status at the final follow-up visit (HR, 0.13; 95% CI, 0.05 to 0.35; p<0.001) were significantly associated with a reduced risk of death (Table 3). In the time-dependent covariate analysis, HCC recurrence (HR, 26.55; 95% CI, 5.14 to 137.21; p<0.001) and cirrhosis recurrence (HR, 9.05; 95% CI, 1.79 to 45.87; p=0.008) were also found to be significantly correlated with an increased risk of death (Table 3). Other factors did not demonstrate statistical significance.

Discussion

This retrospective study presented a comprehensive analysis of demographic, clinical characteristics, outcomes, and prognostic factors among 81 adult liver transplant recipients over a study period spanning approximately 16 years.

Our findings revealed notable improvements in the overall survival rates of adult liver transplant recipients with HCV infection compared to previous studies. Specifically, our study reported 1-, 3-, and 5-year survival rates of 93.7%, 87.6%, and 78.7%, respectively, which were notably higher than those reported in a 2002 Western study (86.4%, 77.8%, and 69.9% at 1, 3, and 5 years, respectively)[6], but lower than rates reported in studies from 1999 and 2000 in Western countries, which demonstrated 3- and 5-year survival rates of 91% and 81 to 84%[15,16]. The decreased survival rate might be attributed to delayed treatment of HCV recurrence in post-LT period. This delay could be due to the fact that some patients underwent transplantation during a period when HCV treatment was less effective and not as widely recommended. Additionally, post-LT complications or chronic graft rejection could have contributed to this outcome, although data regarding these factors were not

Table 3. Cox proportional regression hazard model analysis in patients with chronic hepatitis C who underwent liver transplantation

Variables	Hazard ratios	95% CI	p-value
Female	1.58	0.46 to 5.45	0.47
BMI	0.92	0.8 to 1.05	0.22
Age at LT	1.02	0.95 to 1.08	0.63
Waiting time (days)	1	1	0.38
Donor age ≥45 years	1.37	0.52 to 3.6	0.53
HBV coinfection	1.35	0.18 to 10.21	0.77
Hypertension	0.77	0.32 to 1.88	0.57
Diabetes mellitus	1.43	0.58 to 3.54	0.44
CKD	2.44	0.69 to 8.67	0.17
MELD-Na score at LT	1.02	0.96 to 1.09	0.52
MELD-Na ≥18	1.59	0.64 to 3.91	0.32
CP class A	1	1	1
CP class B	1.84	0.71 to 4.77	0.21
CP class C	1.23	0.25 to 6.01	0.8
Serum creatinine at LT	1.07	0.76 to 1.49	0.7
Platelet at LT	1	1	0.31
Albumin at LT	0.76	0.38 to 1.52	0.44
INR at LT	1.24	0.21 to 7.28	0.81
Pre LT HCV SVR	1.5	0.34 to 6.66	0.6
HCV VL at LT	1	1	0.16
HCV VL after LT ≥10^6 IU/ml	0.16	0.02 to 1.26	0.08
HCV genotype 3	0.31	0.06 to 1.5	0.14
HCV persistent	0.67	0.15 to 2.97	0.6
HCV VL after LT	1	1	0.16
HCV recurrence treatment	0.09	0.03 to 0.3	<0.001
SVR at last F/U	0.13	0.05 to 0.35	<0.001
HCC status	1.19	0.48 to 2.99	0.71
AFP at LT ≥20	2.04	0.44 to 9.45	0.36
HCC recurrence	26.55	5.14 to 137.21	<0.001
Cirrhosis recurrence	9.05	1.79 to 45.87	0.008

BMI=Body mass index; LT=Liver transplantation; HBV=Hepatitis B virus; CKD=Chronic kidney disease; CP class=Child-Pugh class; HCV=Hepatitis C virus; VL=Viral load; SVR=Sustained virologic response; HCC=Hepatocellular carcinoma; AFP=Alpha-fetoprotein

collected in the present study.

HCV recurrence was evident in nearly all instances (98.6%) where HCV RNA was detectable prior to liver transplantation, consistent with previous findings indicating universal recurrence in patients with detectable HCV RNA at the time of transplantation[17].

Cox proportional hazard regression analysis identified HCV recurrence treatment and achieving SVR status at the final follow-up visit as significantly associated with a reduced risk of death, consistent with studies highlighting the improved post-transplant survival following the cure of HCV infection[18,19]. Notably, recurrent HCV infection was associated with 30% to 50% of patients developing minimal liver injury, with 10% to 30% progressing to cirrhosis within a median of 5 years[9], reinforcing the necessity for treatment following post-transplant recurrence, as recommended by EASL guideline[20]. Our study found that the median time to cirrhosis recurrence was approximately 61 months, significantly longer than the 24 months reported in a Western study[15]. This difference may be attributed to the distinct HCV genotypes involved, with genotype 1b in the Western study versus genotype 3 in ours. Additionally, around 28% patients did not receive HCV treatment for HCV recurrence treatment after liver transplantation that could lead to recurrent cirrhosis.

Despite EASL guidelines suggesting early initiation of treatment post-transplantation, our study did not find significant differences in outcomes based on treatment timing. However, our study reported a 100% SVR rate after HCV treatment, primarily with the regimen of 12-week sofosbuvir/velpatasvir, consistent with previous studies[21,22]. In our study, HCV genotype 3 was the most prevalence, similar to one Western study where genotype 3 also comprised the majority[21], though differing from another

Western study where genotype 1 was the most common (51%)[22]. Despite the genotype differences, the SVR rate remained consistently high, demonstrating the treatment's effectiveness across all HCV genotypes.

In our study, 8 patients with BCLC stage B and 2 patients with BCLC stage C underwent liver transplantation. For the BCLC-B group, the HCC tumor sizes slightly exceeded the standard criteria, but the transplant board agreed to proceed with LT (beyond Milan criteria). In the BCLC-C group, discrepancies arose between the surgeon and radiologist in interpreting cross-sectional imaging, specifically regarding lymph node involvement and tumor thrombus. Despite the radiologist's assessment of BCLC stage C, the surgeon proceeded with liver transplantation, given differing interpretations of these critical imaging details and the outcomes were good without HCC recurrence in both of them. Lymph nodes were reactive nodes and no tumor thrombus was seen in pathological section.

The rate of HCC recurrence observed in our study was 7.4%, which lower than rates reported in previous Western studies, which ranged from 8% to 20%[23-26]. HCC recurrence was significantly correlated with an increased risk of death, aligning with previous findings linking early HCC recurrence to worse prognosis[26].

Furthermore, patients with HCC recurrence exhibited a 100% mortality rate at the 3-year post-transplantation period, highlighting the severity of this outcome compared to previous studies reporting a mix of survival and mortality outcomes among patients with post-LT HCC recurrence[27]. This is attributed to the nature of our recurrence being liver, bone, and pulmonary metastasis, rather than de novo HCC.

Similarly, cirrhosis recurrence was significantly associated with an increased risk of death, consistent with previous studies indicating decreased cumulative survival in patients who develop graft cirrhosis[15].

While other factors such as donor age, HCV genotype, HCV viral load before transplantation, recipient sex, HBV coinfection, and MELD-Na score have been associated with post-transplant outcomes in previous studies, our study did not demonstrate significant differences in these parameters[6,28-30].

Seventy-two percent of patients with HCV recurrence underwent HCV treatment, as some of these individuals had undergone transplantation during a time when HCV treatment was less effective and not as strongly advocated.

Overall, our study contributes valuable insights into the demographic, clinical characteristics, outcomes, and prognostic factors among adult liver transplant recipients with chronic HCV infection, providing important implications for clinical management and future research endeavours.

The study's strength lies in its pioneering investigation into the survival rates and factors influencing outcomes among adult liver transplant recipients in Thailand. Conducted at the premier liver transplant center in the country, our study benefited from data spanning a remarkable 16-year transplantation period.

However, several limitations warrant consideration: Firstly, the retrospective nature of the study resulted in some missing information, attributed to historical data recording systems. Secondly, the presence of missing data may have impacted the statistical significance of certain factors. Lastly, the accuracy of timing for HCV recurrence after liver transplantation was compromised by the lack of a standardized protocol for detecting HCV recurrence, leading to dependency on individual physician orders for laboratory testing.

Conclusion

Over the 16-year period, the 5-year overall survival rate for liver transplant recipients with HCV infection was 75.3%. The recurrence of HCC and cirrhosis were the significant risk factors for reducing overall survival. Conversely, LT patients who underwent HCV treatment and achieved SVR status at the final follow-up visit demonstrated a good factor to improve overall survival.

What is already known on this topic?

LT recipients with chronic HCV infection have reported the 5-year survival rates ranging from 60% to 80% which is lower compared to other indications for LT. Graft failure from persistent HCV infection and HCC are the primary causes of mortality in this population. Several studies have shown that post-LT patients with HCV recurrence are affected by multiple factors influencing their outcomes, such as the immunosuppressive regimens, HCV viral load level before transplantation, HCV genotype, and the age of the donor Moreover, HCC also significantly impacts the survival of LT recipients with HCV infection, with HCC patients demonstrating lower survival rates compared to those without HCC at both 3 and 5 years. However, all previous studies have been conducted in Western countries, and none have yet been reported in Eastern world, especially Thailand.

What this study adds?

the 5-year overall survival rate for liver transplant recipients with chronic HCV infection was 75.3%. The recurrence of HCC and cirrhosis were the significant risk factors for reducing overall survival. Conversely, LT patients who underwent HCV treatment and achieved SVR status at the final follow-up visit demonstrated a good factor to improve overall survival. Thus, our study contributed valuable insights into the demographic, clinical characteristics, outcomes, and prognostic factors among

adult liver transplant recipients with chronic HCV infection, providing important implications for improving clinical management and developing future research endeavours.

Acknowledgements

The authors would like to thank the KKU liver transplantation committee for permission and support to do this research, Department of Medicine, Faculty of Medicine, Khon Kaen University for publication support, and Gastroenterological Association of Thailand (GAT) for research funding.

Conflicts of interest

The authors declare no conflict of interest.

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