

Limits of Subsidized Medical Care in Reducing the Effect of Socioeconomic Disparities: Liver Cirrhosis Mortality in Japan

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Abstract

Background: Alcoholic liver cirrhosis is a life-threatening condition, especially in patients who are unable to reduce their alcohol use. Alcohol abuse is closely linked to low socioeconomic status and social marginalization. In Japan, public assistance (PA) or Seikatsu-hogo ensures medical care for low-income populations. This study aimed to investigate the potential excess mortality among patients with alcoholic cirrhosis who were recipients of PA.

Methods: Patients diagnosed with alcoholic liver cirrhosis at a community hospital between 2006 and 2017 were included in this retrospective study. Baseline demographics and mortality data were extracted from the electronic health records. Cirrhosis severity at baseline was measured using the mean model for end-stage liver disease (MELD) and albumin-bilirubin (ALBI) scores. The primary outcome was the survival probability obtained using the Cox proportional hazards regression analysis.

Results: A total of 244 participants were included, of which 62 were PA recipients. Baseline cirrhosis severity scores did not differ between the PA group and non-PA groups. The overall mortality rates were 48.4% and 31.9% for PA and non-PA recipients, respectively ($p=0.002$). In the Cox regression model adjusted for age, ALBI score, HCV infection, and presence or absence of a designated key family contact, the hazard ratio for PA status was 1.75 [95%CI 1.03–2.98, $p=0.039$].

Conclusions: Being a PA recipient is a poor prognostic factor for overall mortality in patients with alcoholic liver cirrhosis after adjusting for age, cirrhosis severity, and social support.

Key words: Public assistance, socioeconomic status, alcoholic liver cirrhosis

Introduction

The burden of alcohol abuse is increasing rapidly worldwide. Alcohol is the seventh leading risk factor in disability-adjusted life years, with an increase of > 25% from 1990 to 2016¹⁾. According to the World Health Organization, alcohol consumption contributes to 3 million deaths each year globally²⁾. In a national UK cohort, 85% of alcohol-related

deaths were due to chronic liver disease and cirrhosis³⁾. In Japan, annual age-standardized deaths from cirrhosis for men are 10.9 per 100,000, and 67.8% are attributed to alcohol consumption⁴⁾.

Alcohol abuse is closely linked to socioeconomic status (SES) and has a synergistic effect on it. In the UK, the alcohol-related death risk was 4.73 times higher for men in the most deprived quintile compared to those in the least deprived³⁾. Alcohol-related

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mortality rates are higher in lower educational and occupational groups, accounting for > 10% of the socioeconomic inequality in total mortality⁵.

The effect of SES on liver disease has been studied in the context of hepatocellular carcinoma (HCC) and cirrhosis; however, the results are controversial. Medicaid patients with HCC have a poorer survival compared to those with private insurance; however, the difference is not significant after adjustment for the Child-Pugh and model for end-stage liver disease (MELD) scores⁶. The richest patients with HCC in the US have a 10% higher chance of survival because they are more likely to receive potentially curative treatment⁷. Evidence from China also suggests that a low household income is associated with poorer HCC outcomes, presumably because these patients have more advanced stages at the time of diagnosis⁸. Cause-specific mortality due to alcoholic cirrhosis is elevated in the low early-life SES group in Sweden⁹. Educational level, marital status, and occupational skill level are reportedly poor prognostic factors for liver cirrhosis¹⁰⁻¹³. However, to our knowledge, no study has investigated the association between SES and alcoholic cirrhosis mortality in the context of the Japanese medical system.

Low-income individuals in Japan incur minimum living costs through a national public assistance (PA) system called Seikatsu-Hogo. The PA system is a safety net for the Japanese welfare system. The injured or sick who cannot afford the premium payment and the older population without sufficient pension benefits rely on PA programs¹⁴. PA comprises income security, employment support, and an in-kind supply of medical and long-term care financed by taxation. Therefore, PA beneficiaries can receive the same medical service as any other Japanese citizen without any out-of-pocket payments. Currently, 2.05 million people (1.63% of the total population) are PA beneficiaries¹⁵. Approximately, 82.5% of the households receiving PA in the Kanagawa prefecture, where our study was conducted, are members of single households¹⁶. This is because PA is provided based on a requirement that the person who is living in poverty shall utilize his or her assets, abilities, and every other thing available before receiving PA¹⁷. In other words, those with a family member to provide financial support are not eligible for PA.

The health status of PA recipients is reportedly inferior to that of the non-PA population, despite medical care access being as good as, if not superior, to that of non-PA recipients. Moral hazards or exces-

sive care use have been a problem in PA recipients' medical care. Frequent emergency department users were more likely to be PA recipients^{18, 19}; medical expenditures and the frequency of doctor visits were elevated in PA recipients^{14, 20}. Despite the greater use of medical services, being a PA beneficiary has been identified as a risk factor for delay in seeking health-care in patients with tuberculosis²¹, greater risk of diabetic retinopathy in young adult type 2 diabetes patients²¹, poorer survival in head and neck cancer²², and risk of geriatric depression²³. However, receiving PA and attending a self-help group was a predictor of stable abstinence in alcohol addiction²⁴. To our knowledge, no previous study has revealed an association between PA and alcoholic liver cirrhosis-induced mortality.

Therefore, this study aimed to investigate whether being a PA beneficiary was a poor prognostic factor for mortality in Japanese patients with alcoholic liver cirrhosis.

Materials and Methods

Study population and inclusion criteria

A total of 727 patients were diagnosed with liver cirrhosis (LC) at our institution between 2006 and 2017. Our institution is a public hospital located in the suburbs of the Tokyo metropolitan area with 376 beds and an outpatient ward. The LC etiology was investigated by trained hepatologists, and 469 patients were excluded because the LC etiology was not alcoholic. Eventually, 258 participants with a history of excessive alcohol consumption and a diagnosis of alcoholic LC were identified. Twelve patients who had only visited our outpatient department once and two whose further medical record review revealed no presence of alcoholic LC were excluded from the analysis. Finally, 244 patients were included in the study. At the end of the follow-up period, all person-months are summed up to represent the cumulative time at risk for disease. The flowchart of the participants' inclusion and exclusion is shown in **Figure 1**.

Basic demographics

The basic demographics at the time of diagnosis were obtained through a medical record review. Age, sex, body mass index (BMI) (calculated by height and weight), chief complaint, and emergency hospitalization at the first visit were recorded. Coexistence of viral hepatitis such as hepatitis B virus (HBV) and hepatitis C virus (HCV), and laboratory findings in-

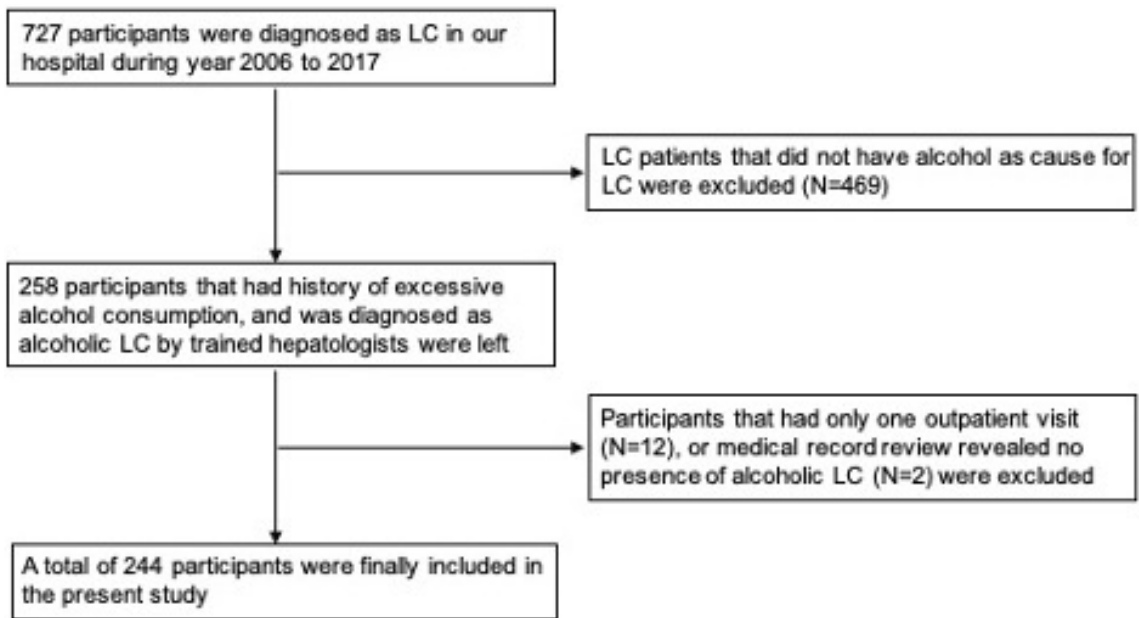


Figure 1. Inclusion and exclusion criteria of patients
LC, liver cirrhosis; N, numbers.

cluding aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatinine, total bilirubin, albumin, and prothrombin time-international normalized ratio (PT-INR) levels, and platelet count ($10^4/\mu\text{L}$) were obtained. Liver cirrhosis severity was measured using the MELD²⁵⁾ and albumin-bilirubin (ALBI) scores²⁶⁾.

Data on whether the participant was a PA beneficiary were obtained from the insurance status of the medical records. Other socioeconomic data obtained were whether the patient was residing alone and if they did not have a key person (KP). The KP is a family member, not necessarily cohabiting with the patient, who can serve as a contact when the patient is sick or in trouble. We defined the participants' KP as one whose phone number was listed in the contact information of the medical records. If the contact number was not for a family member, but of a welfare personnel, social worker, or workplace coworker, or if there was no contact information provided, we identified the person as not having a KP.

Outcome measurements

The primary outcome of our study was the survival time after a alcoholic liver cirrhosis diagnosis. The patients were followed up until death or were censored due to follow-up loss as of March 2020.

The incidence of ascites, esophageal varices,

HCC, encephalopathy, and spontaneous bacterial peritonitis (SBP) was obtained as the secondary outcome of the study. The presence of ascites, varices, and HCC observed at any point during the follow-up period was considered as positive. Encephalopathy and SBP episodes were included only if they were recorded at our hospital.

Statistical analysis

Basic demographics are depicted as medians and interquartile ranges or percentages, depending on whether the variable is linear or bivariate. The differences in binary variables between the two were analyzed using Chi-squared test. Mann—Whitney U tests were applied for continuous variables since they all had a non-normal distribution. For survival analysis, we determined that hazard ratios were constant over the follow-up period using Schoenfeld residuals. The mean survival time, survival rate at median follow-up, and five-year survival rate were obtained from the Kaplan—Meier survival curve for the two subgroups. We included receiving PA, age, HCV infection, ALBI score, and no KP in a multivariate Cox hazard model to obtain the adjusted hazard ratio. An additional survival analyses was conducted to obtain the mortality incidence ratio for the four groups according to the presence or the absence of PA and KP status. The significance level was set at $\alpha = 0.05$. All

statistical analyses were performed using the STATA (version 16; Stata Corporation, College Station, TX, USA).

Ethical approval

The study protocol was approved by the institutional review board of St. Marianna University School of Medicine (No: 4995). The need for informed consent was waived because the data utilized were routinely acquired in clinical practice. The study details were displayed at the hospital to allow patients to opt out of the study.

Results

A total of 244 patients met our inclusion criteria, of which 62 (26.1%) were PA recipients. The median follow-up period was 819 days. A total of 209 (79.8%) patients were men, and the median age was 61.5 [54–70]. The basic demographics are shown in **Table 1**. The percentage of those living alone and those without a KP greatly differed between PA and non-PA recipients: 74.2% versus 28.6% ($p<0.001$) and 29.0% versus 7.1% ($p<0.001$), respectively. The mean MELD and ALBI scores were 6.7 [3.5–11.7] and -2.03 [-2.49– -1.43], respectively, which were not significantly different between the two subgroups. Of all patients, 24.4% required emergency admission at the first visit, and the proportion did not differ between the two subgroups. As shown in **Supplementary table 1**, the most common chief complaint was asymptomatic liver dysfunction ($n=89$; 36.5%). Other common symptoms were abdominal distension and edema ($n=51$, 20.9%), fatigue and immobility ($n=20$, 8.2%), and gastrointestinal and variceal bleeding ($n=24$, 9.8%).

The primary and secondary outcomes are shown in **Table 2**. During a total follow-up period of 9100 months added up for all the 244 participants, 88 (33.6%) patients died. The mortality incidence was 48.4% in PA recipients versus 31.9% in non-PA recipients ($p=0.019$). The five-year survival rate for PA and non-PA recipients was 45.2% and 57.8%, respectively. The overall treatment dropout rate was 18.3%, which did not differ between the two subgroups. Causes of death included HCC, acute-on-chronic liver failure, encephalopathy, and varices rupture. The occurrence of complications (ascites, varices, HCC, SBP, and encephalopathy) did not differ between the two groups.

Table 3 revealed the cox hazard model with receiving PA, age, HCV infection, ALBI score and hav-

ing a KP as covariates. PA recipients had a higher overall mortality risk than non-recipients with a hazard ratio of 1.781 [95% CI:1.088–2.918, $p=0.022$]. In multivariable analyses, age (HR: 1.04, 95% CI: 1.012–1.064, $p<0.001$) and ALBI score (HR: 1.834, 95% CI: 1.299–2.589, $p=0.001$) were independent predictors of mortality.

Table 4 shows the mortality incidence for the four groups defined by PA status and KP. Patients receiving PA had a higher mortality rate with or without KP; however, the statistical power was low due to the small sample size.

Discussion

In this retrospective cohort study of 244 patients with alcoholic liver cirrhosis, we found that PA recipients tended to have a higher risk of death than non-PA recipients, after adjusting for age, HCV infection, and ALBI score. Parameters at first presentation did not differ between the two subgroups, except that PA recipients were marginally younger. Social isolation, as measured by residing alone and having no KPs, was remarkably higher among the PA recipients than among the non-PA recipients. The baseline severity of liver dysfunction, as measured using the MELD and ALBI scores, and the proportion of patients requiring emergency hospitalization at first presentation, were comparable between the two groups.

Low-income individuals in Japan do not face any financial barriers to healthcare services. Despite the financial and medical assistance provided, our results showed that mortality was significantly higher in the PA-recipient group than in the non-PA group. Our results suggest that the PA system in Japan, at least for alcoholic liver cirrhosis, does not fully address the elevated health risks associated with low SES. Non-financial barriers or upstream determinants of health might be the cause for the higher mortality rate among PA recipients.

Our study revealed a tendency for higher mortality among patients who received PA. Jepsen et al. has previously shown a non-significant increase in mortality in the lower-income population with cirrhosis, which is concordant with our study. They also identified poorer prognosis for cirrhosis among divorced and unmarried individuals than among married participants¹⁰⁾. Our study results are consistent with these; PA recipients were more likely to be living alone or have no KPs and tended to have a poorer prognosis. This may be due to a lack of social support from family members or workplace communities²⁷⁾.

Table 1. Basic Demographics of the Participants

	Subgroup by public assistance			
	Overall	Non-PA	PA	p value
	(n=244)	(n=182)	(n=62)	
Demographics				
Age	61.8 [60.3-63.3]	62.6 [60.7-64.4]	59.6 [57.1-62.0]	0.05 *
Male	209 (85.7%)	156 (85.7%)	53 (85.5%)	0.96
Living alone	98 (40.2%)	52 (28.6%)	46 (74.2%)	<0.001 *
No KP	31 (12.7%)	13 (7.14%)	18 (29.0%)	<0.001 *
Nursing care	63 (25.8%)	43 (23.6%)	20 (32.3%)	0.29
BMI	22.5 [21.9-23.0]	22.4 [21.8-23.1]	22.5 [21.5-23.6]	0.86
Presentation at first visit				
HCV infection	52 (21.3%)	31 (17.0%)	21 (33.9%)	0.005 *
AST	112.5 [85.9-139.2]	113 [86.2-141.1]	109 [41.8-176.8]	0.06
ALT	56.4 [44.9-67.9]	56.5 [45.0-67.9]	56.2 [25.8-86.5]	
Total Bilirubin	2.61 [2.21-3.00]	2.70 [2.23-3.18]	2.32 [1.69-2.96]	0.69
Albumin	3.43 [3.34-3.52]	3.44 [3.35-3.54]	3.40 [3.23-3.58]	0.53
PT-INR	1.16 [1.13-1.20]	1.18 [1.13-1.22]	1.15 [1.09-1.21]	0.92
Platelet	13.4 [12.4-14.5]	13.4 [12.2-14.6]	13.7 [11.6-15.7]	0.34

Cirrhosis severity at first**visit****MELD**

	8.07	7.89	8.58	
Mean	[7.40-8.98]	[6.97-8.82]	[6.87-10.29]	0.48

ALBI

	-1.92	-1.93	-1.89	
Mean	[-2.04- -	[-2.04- -	[-2.09- -	0.65
	1.83]	1.83]	1.70]	
Grade n(%)				
Grade 1	45 (17.2%)	32 (17.6%)	13 (21.0%)	0.83
Grade2	142 (54.2%)	108 (59.3%)	34 (54.8%)	
Grade3	56 (23.0%)	41 (22.5%)	15 (24.2%)	

Hospitalization

Emergent n(%)	64 (26.2%)	46 (25.3%)	18 (29.0%)	0.577
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Data are represented as medians or percentages. The N for each category was 194 (141 for non-PA and 53 for PA) for BMI, 179 (121 for non-PA and 58 for PA) for living alone, 186 (130 for non-PA and 58 for PA) for living in nursing homes, 187 (128 for non-PA and 59 for PA) for having KP, and 243 (181 for non-PA and 62 for PA) for ALBI grade and emergent hospitalization because of missing data. KP, key person; BMI, body mass index; DM, diabetes mellitus; HCV, hepatitis C virus; AST, aspartate aminotransferase; ALT, alanine transaminase; MELD, model for end-stage liver disease; ALBI, albumin-bilirubin; PA, public assistance; n, number. * represents the statistical significance of p-value below 0.05, calculated using Mann-Whitney U test for continuous variables and the Chi-squared test for categorical variables.

Supplementary table 1. Chief Complaint at the First Hospital Visit and the Primary Medical Condition Contributing to the Chief Complaint

		Subgroup by public	
	Overall	assistance	
	(n=244)	Non-PA	PA
		(n=182)	(n=62)
Chief complaint n(%)			
Abdominal distension, edema	51 (20.9%)	37 (20.3%)	14 (22.6%)
Immobility, fatigue	20 (8.2%)	12 (6.6%)	8 (12.9%)
Asymptomatic	89 (36.5%)	70 (38.5%)	19 (30.7%)
Disconsciousness	12 (4.9%)	9 (5.0%)	3 (4.8%)
Abdominal and chest pain	17 (7.0%)	12 (6.6%)	5 (8.1%)
Hematemesis, hemorrhagic stool	24 (9.8%)	18 (9.9%)	6 (9.7%)
Jaundice	17 (7.0%)	16 (8.8%)	1 (1.6%)
Others	14 (5.7%)	8 (4.4%)	6 (9.7%)
Main medical condition n(%)			
Ascites	62 (25.4%)	42 (23.1%)	20 (32.3%)
Varices, varices rupture	30 (12.3%)	23 (12.6%)	7 (11.3%)
HCC, HCC rupture	31 (12.7%)	23 (12.6%)	8 (12.9%)
Liver dysfunction	84 (34.4%)	64 (35.2%)	20 (32.3%)
Encephalopathy	12 (4.9%)	9 (5.0%)	3 (4.8%)
Others	9 (3.7%)	6 (3.3%)	3 (4.8%)

HCC, Hepatocellular carcinoma; PA, public assistance.

Table 2. Primary and Secondary Outcomes for PA and Non-PA Recipients

	Overall (n=244)	Subgroup by public assistance			
		Non-PA (n=182)	PA (n=62)	p value	
Mortality					
Incidence proportion	88 (36.1%)	58 (31.9%)	30 (48.4%)	0.02 *	
Median survival time (days)	2104 [1589-3563]	2889 [1692 - N/A]	1559 [1589 - 3563]	N/A	
Survival rate at median follow up	75.3% [68.7-80.7]	76.6% [68.8-82.7]	69.9% [56.0 - 80.1]	0.28	
Five year survival rate	54.2% [45.6-62.0]	57.8% [47.7-66.6]	45.2% [29.2-60.6]	0.07	
Treatment adherence					
Dropout rate	48 (19.7%)	38 (20.9%)	10 (16.1%)	0.08	
Cause of death					
Encephalopathy	11 (4.5%)	5 (2.7%)	6 (9.7%)	0.007 ^a	
HCC	14 (5.7%)	12 (6.6%)	2 (3.2%)		
HCC rupture	11 (4.5%)	11 (6.0%)	0		
Acute on chronic liver failure	15 (6.1%)	10 (5.5%)	4 (6.5%)		
Other carcinomas	7 (2.8%)	5 (2.7%)	2 (3.2%)	0.81	
SBP	2 (0.8%)	0	2 (3.2%)		
Sepsis/infection	4 (1.6%)	2 (1.1%)	2 (3.2%)		
Varix rupture	11 (4.5%)	6 (3.3%)	5 (8.1%)		
Other/ unknown	13 (5.3%)	7 (3.8%)	7 (11.2%)	0.55	
Complications					
Ascites	203 (83.2%)	152 (83.5%)	51 (82.2%)		
HCC	97 (39.8%)	73 (40.1%)	24 (38.7%)		
SBP	17 (7.0%)	11 (6.04%)	6 (9.7%)	0.87	
				0.32	

Encephalopathy	66 (27.0%)	48 (26.4%)	18 (29.0%)	0.65
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N for each category was 241 for ascites, 232 for varix, 238 for HCC, and 243 for SBP and

encephalopathy due to missing data. CPA, cardiopulmonary arrest; HCC, hepatocellular

carcinoma; SBP, spontaneous bacterial peritonitis; PA, public assistance; n, number. *

represents the statistical significance of a p-value below 0.05, calculated using the Chi-

squared test. ^a: the P value for the cause of death was obtained by comparing the

expected probability of each cause.

Table 3. Cox Proportional Hazard Model for Mortality

	Cox HR	95 CI	p value
Age	1.04	1.012-1.064	<0.001*
HCV infection	1.188	0.733-1.925	0.70
ALBI score	1.834	1.299-2.589	0.001*
No KP	1.001	0.995-1.007	0.22
Receiving PA	1.781	1.088-2.918	0.022*

HR, hazard ratio; 95 CI, 95 percent confidence interval; HCV, hepatitis C virus; ALBI,

albumin-bilirubin; KP, key person; PA, public assistance.

The additional stratified analyses based on presence or absence of PA and KP revealed that in both strata, PA recipients had higher mortality than non-PA recipients, although the statistical difference could not be calculated owing to the small sample size. The lack of KP could not wholly explain the higher mortality in the PA group, implying that there may be other associated health risks in the PA population.

The MELD score is an objective score calculated using creatinine, total bilirubin, albumin, and PT-INR²⁵⁾. Whether the discrimination power of the MELD score in predicting mortality is superior to

that of the Child-Pugh score, a classical scoring system for liver cirrhosis, is controversial. However, a systematic review in 2016 reported that the MELD score is as reliable a prognostic score as the Child-Pugh score²⁸⁾. The ALBI score is reportedly the optimal mortality predictor²⁹⁾. Furthermore, a study among Asians reported that ALBI is a reliable predictor of short-term outcomes, whereas the MELD score was better in assessing long-term outcomes³⁰⁾. Considering that ascites and encephalopathy components of Child-Pugh scoring are subjective, we employed the MELD and ALBI scores in the current study.

Table 4. Mortality Incidence Ratio of the Four Groups According to the Presence or the Absence of PA and KP Status

		PA status	
		Non-PA	PA
Has KP	Total	114	41
	Death	41 (36.0%)	21 (51.2%)
No KP	Total	13	18
	Death	2 (15.4%)	9 (50.0%)

KP, key person; PA, public assistance.

Cirrhosis severity and the need for emergent hospitalization at the first visit did not differ between the two groups at the time of diagnosis. Treatment dropout rates were also indistinguishable between the two groups. HCC patients on the Medicaid program reportedly have a higher mortality; however, the difference was attributed to a higher MELD score at the time of diagnosis⁶⁾. In our study, neither the cirrhosis severity at the time of diagnosis nor dropout rate was different between the PA recipients and non-PA recipients. This indicated that there was no healthcare access barrier at either the time of diagnosis or in the treatment continuum among patients with cirrhosis who visited our hospital.

Our study has several clinical implications. One possible explanation for the higher mortality in PA recipients may be the hardships experienced by them trying to quit alcohol. There is a strong relationship between alcohol-related deaths and social marginalization^{3,5)}. Although we could not measure the severity of alcohol addiction in our study, it is possible that PA recipients had a lower alcohol cessation rate after diagnosis, probably due to a lack of family or social support. Therefore, clinicians should provide appropriate support to improve health-related behaviors of patients with alcoholic cirrhosis. The results also imply that providing alcohol cessation information and connecting marginalized patients to social support systems, such as mutual self-help groups, may improve a PA recipients' prognosis.

Our study had some limitations. Our study was conducted at a single center with a sample size that limited the number of covariates that could be included in multivariable analyses. We did not consider co-

morbidities other than HCV infection and HCC; deaths may have occurred due to other critical illnesses. In addition, we could only measure limited SES factors. A more in-depth investigation of discrete SES components is needed to identify which upstream drivers of health strongly affect the prognosis of patients with cirrhosis.

Conclusions

In conclusion, the overall mortality in patients with alcoholic liver cirrhosis may be associated with low SES despite receiving PA. In Japan, medical care is completely free with no out-of-pocket payments for PA beneficiaries. However, financially subsidizing medical care could not eliminate the disparity in mortality of among this population. Further studies are needed to investigate the cause of the higher mortality among PA recipients in Japan and identify potential interventions to decrease the disease burden.

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Conflicts of interest

None declared.

References

- 1) Alexy PD, Richardson CT, Singal AK. Epidemiology of alcohol consumption and societal burden of alcoholism and alcoholic liver disease. *Clin Liver Dis* 2019; 23: 39–50.
- 2) WHO. Global Information System on Alcohol and Health. <https://www.who.int/data/gho/data/themes/global-information-system-on-alcohol-and-health>. Retrieved on May 19, 2021.
- 3) Erskine S, Maheswaran R, Pearson T, et al. Socioeconomic deprivation, urban-rural location and alcohol-related mortality in England and Wales. *BMC Public Health* 2010; 10: 99. doi: 10.1186/1471-2458-10-99.
- 4) Sarin SK, Kumar M, Eslam M, et al. Liver diseases in the Asia-Pacific region: a Lancet Gastroenterology & Hepatology Commission. *The Lancet Gastroenterology & Hepatology Commission Lancet Gastroenterol Hepatol* 2020; 5:167–228.
- 5) Mackenbach JP, Kulháňová I, Bopp M, et al. In-

- equalities in alcohol-related mortality in 17 European countries: a retrospective analysis of mortality registers. *PLoS Med* 2015; 12: e1001909. doi: 10.1371/journal.pmed.1001909.
- 6) Sellers CM, Uhlig J, Ludwig JM, et al. The impact of socioeconomic status on outcomes in hepatocellular carcinoma: inferences from primary insurance. *Cancer Med* 2019; 8: 5948–5958.
 - 7) Jembere N, Campitelli MA, Sherman M, et al. Influence of socioeconomic status on survival of hepatocellular carcinoma in the Ontario population; a population-based study, 1990–2009. *PLoS One* 2012; 7: e40917. doi: 10.1371/journal.pone.0040917.
 - 8) Shen Y, Guo H, Wu T, et al. Lower education and household income contribute to advanced disease, less treatment received and poorer prognosis in patients with hepatocellular carcinoma. *J Cancer* 2017; 8: 3070–3077.
 - 9) Lawlor DA, Sterne JAC, Tynelius P, et al. Association of childhood socioeconomic position with cause-specific mortality in a prospective record linkage study of 1, 839, 384 individuals. *Am J Epidemiol* 2006; 164: 907–915.
 - 10) Jepsen P, Vilstrup H, Andersen PK, et al. Socioeconomic status and survival of cirrhosis patients: a Danish nationwide cohort study. *BMC Gastroenterol* 2009; 9: 35. doi: 10.1186/1471-230X-9-35.
 - 11) Vaz J, Strömberg U, Eriksson B, et al. Socioeconomic and marital status among liver cirrhosis patients and associations with mortality: a population-based cohort study in Sweden. *BMC Public Health* 2020; 20: 1820. doi: 10.1186/s12889-020-09783-2.
 - 12) Dalmau-Bueno A, García-Altés A, Marí-Dell’Olimo M, et al. Trends in socioeconomic inequalities in cirrhosis mortality in an urban area of Southern Europe: a multilevel approach. *J Epidemiol Community Health* 2010; 64: 720–727.
 - 13) Hemmingsson T, Lundberg I, Romelsjö A, et al. Alcoholism in social classes and occupations in Sweden. *Int J Epidemiol* 1997; 26: 584–591.
 - 14) Yuda M. The medical assistance system and inpatient health care provision: empirical evidence from short-term hospitalizations in Japan. *PLoS One* 2018; 13: e0204798. doi: 10.1371/journal.pone.0204798.
 - 15) Ministry of Health L and W. Ministry of Health, Labour and Welfare Press Release. <https://www.mhlw.go.jp/toukei/saikin/hw/hihogosya/m2021/d1/01-01.pdf>. Retrieved on May 15, 2021.
 - 16) Kanagawa Prefectural Government. Kanagawaken no seikatsuhogo no gaikyou nitsuite [In Japanese]. <https://www.pref.kanagawa.jp/docs/r6w/cnt/f152/p2909.html>. Retrieved on May 21, 2022.
 - 17) Seikatsu-hogo hou [In Japanese]. Act No. 144 of 1950. https://www.mhlw.go.jp/web/t_doc?dataId=82048000&dataType=0&pageNo=1. Retrieved on May 21, 2022.
 - 18) Kaneko M, Inoue M, Okubo M, et al. Differences between frequent emergency department users in a secondary rural hospital and a tertiary suburban hospital in central Japan: a prevalence study. *BMJ Open* 2020; 10: e039039. doi: 10.1136/bmjopen-2020-039030.
 - 19) Osawa I, Sato T, Goto T, et al. Characteristics and subgroups of frequent emergency department users in an academic hospital in Japan. *Acute Medicine & Surgery* 2020; 7: e535. doi: 10.1002/ams2.535.
 - 20) Yuda M. Healthcare utilization under a comprehensive public welfare program: evidence from Japan. *Front Public Health* 2022; 10. doi: 10.3389/fpubh.2022.895679.
 - 21) Funakoshi M, Azami Y, Matsumoto H, et al. Socioeconomic status and type 2 diabetes complications among young adult patients in Japan. *PLoS One* 2017; 12: e0176087. doi: 10.1371/journal.pone.0176087.
 - 22) Takenaka Y, Yasui T, Enomoto K, et al. Health insurance status and survival among patients with head and neck cancer in Japan. *Int J Clin Oncol* 2016; 21: 517–522.
 - 23) Kino S, Nishioka D, Ueno K, et al. Public assistance program and depressive symptoms of the recipient: a cross-sectional Japan Gerontological Evaluation Study. *BMC Geriatr* 2022; 22: 177. doi: 10.1186/s12877-022-02868-0.
 - 24) Noda T, Imamichi H, Kawata A, et al. Long-term outcome in 306 males with alcoholism. *Psychiatry Clin Neurosci* 2001; 55:579–586.
 - 25) Kamath PS, Wiesner RH, Malinchoc M, et al. A model to predict survival in patients with end-stage liver disease. *Hepatology* 2001; 33: 464–470.
 - 26) Chan AWH, Chan RCK, Wong GLH, et al. New simple prognostic score for primary biliary cirrhosis: albumin-bilirubin score. *Journal of Gastroenterology and Hepatology* 2015; 30: 1391–

- 1396.
- 27) Sugiyama Y, Matsushima M, Yoshimoto H. Association between alcohol consumption/ alcohol use disorders and patient complexity: a cross-sectional study. *BMJ Open* 2020; 10: e034665. doi: 10.1136/bmjopen-2019-034665.
 - 28) Peng Y, Qi X, Guo X. Child-pugh versus MELD score for the assessment of prognosis in liver cirrhosis a systematic review and meta-analysis of observational studies. *Medicine* 2016; 95: e2877. doi: 10.1097/MD.0000000000002877.
 - 29) Fragaki M, Sifaki-Pistolla D, Orfanoudaki E, et al. Comparative evaluation of albi, meld, and child-pugh scores in prognosis of cirrhosis: is albi the new alternative? *Ann Gastroenterol* 2019; 32: 626–632.
 - 30) Wan SZ, Nie Y, Zhang Y, et al. Assessing the prognostic performance of the Child-Pugh, model for end-stage liver disease, and albumin-bilirubin scores in patients with decompensated cirrhosis: a large Asian cohort from gastroenterology department. *Dis Markers* 2020; 5193028. doi: 10.1155/2020/5193028.