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# 博士論文

**Lifestyle of patients with alcoholic liver disease and factors  
leading to hospital readmission: a prospective observational study**

(アルコール性肝障害患者の再入院に至るライフスタイルと

その背景要因：前向き観察研究)

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# Lifestyle of Patients with Alcoholic Liver Disease and Factors Leading to Hospital Readmission: A Prospective Observational Study

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**Key Words:** Alcoholic liver diseases, Lifestyle, Readmission, Prospective study, Loss

The objective of this study was to clarify the lifestyle characteristics of patients with alcoholic liver disease (ALD) who were readmitted to the hospital, and to identify the background factors associated with these characteristics.

This was a prospective observational study. Over a period of 3 months following hospital discharge, we conducted structured interviews to investigate the following five lifestyle characteristics based on our previous research: dietary intake, alcohol consumption or abstinence, psycho-emotional status, regularity of life habits, adherence to treatment. We also collected data on background factors from medical records and questionnaires. The analysis was performed using conceptual cluster matrices, with participants divided into two groups (at-home recovery and readmission). Lifestyle, health status, and background factors were compared between the two groups.

Of the 34 patients with ALD recruited, 21 completed the one-month follow-up and were included in the analysis—14 patients were in the at-home recovery group and 7 in the readmission group. The at-home group's lifestyle was characterized by controlled alcohol consumption, but with maintenance of regular life and eating habits and adherence to treatment. In contrast, irregular eating habits ( $p=0.006$ ) and the development of irregular life habits or the discontinuation of treatment very quickly after hospital discharge characterized the readmission group's lifestyle. Experiences of loss were a lifestyle-related background factor that was associated with readmission ( $p=0.017$ ).

Based on these findings, supporting patients with ALD in maintaining regular eating habits and taking experiences of loss into consideration would be important in avoiding readmission over the short-term.

## INTRODUCTION

Alcoholic liver disease (ALD) is the most common cause of severe liver disease in adults. Recently, the readmission rate of patients with ALD, in the 2 months after hospital discharge, has increased to 37.5%, with the 1-year mortality rate, after discharge, rising to 40% (10, 26, 28). As such, ALD is a major public health concern. In addition to pharmacotherapy and psychotherapy, recuperative therapies, based on abstinence from alcohol, are considered important to the treatment of ALD (7, 27). The importance of comprehensive nursing support, that takes the effects of alcohol consumption into consideration, has also been pointed out (9). Regardless of treatment, many patients with ALD in Japan find it difficult to continue abstaining from alcohol, taking medication, and other self-management behavior after being discharged from the hospital, leading to repeated readmissions (23).

The goals of nursing support for patients with ALD are continuance of self-management behavior and avoiding of readmission. This entails not only general guidance on not drinking and adherence to dietary therapy, but assistance that takes the characteristics of patients' lifestyles after hospital discharge into consideration. Therefore, to avoid readmissions, it is important to propose concrete support methods that will enable patients to live and recover at home.

One factor that raises the risk of readmission for patients with ALD is a high-protein, high-cholesterol diet (14), while risk factors for ALD deterioration include excessive alcohol consumption, smoking, old age, obesity, and type 2 diabetes (3, 5, 12, 20, 27). However, the lifestyles that cause patients with ALD to be readmitted to the hospital, and the background factors associated with these lifestyles, have not been investigated. Therefore, as the first stage of our research, we retrospectively conducted semi-structured interviews with ALD patients,

who had been repeatedly readmitted to the hospital, then carried out a qualitative-descriptive analysis to clarify the characteristics of their lifestyles and other factors. The results showed that readmission was not only related to the inability to control alcohol consumption, but to 4 other lifestyle characteristics: irregular dietary intake, unstable psycho-emotional status leading to feelings of abandonment, irregular life habits, and non-adherence to treatment (23). In addition, most patients were readmitted within 3 months of hospital discharge (23). To propose concrete methods for assisting patients with ALD to recover at home, and avoid readmission, we decided that a prospective, survey-based, study of the aforementioned 5 characteristics of the lifestyle of patients with ALD after discharge was necessary to determine which lifestyle characteristics enabled patients to continue at-home recovery, and which led to readmission. Examining the background factors associated with readmission was also considered important.

The objective of this study, therefore, was to conduct a prospective follow-up survey of the 3 months after hospital discharge for the following 5 lifestyle categories (dietary intake, alcohol consumption or abstinence, psycho-emotional status, regularity of life habits, adherence to treatment) to clarify the lifestyle characteristics, and the background factors of these characteristics, of patients with ALD who were readmitted to hospital.

## MATERIALS AND METHODS

### Design

This was a prospective observational study. To examine the lifestyle characteristics of patients with ALD who were readmitted, and the background factors of these characteristics, follow-up surveys on patients' lives during recovery in the 3 months after hospital discharge were conducted.

### Participants

The participants were men with ALD who fulfilled the following criteria: (a) hospitalized for ALD treatment at the survey location during the study period, (b) consented to participate in the study, (c) had no symptoms of alcohol withdrawal, (d) were able to respond to questionnaires and communicate, and (e) had no planned hospitalizations (such as for anticancer or interferon treatment). The study was conducted over a 1-year period, from April 2014 to March 2015, at a hospital in City A that specializes in hepatic diseases.

### Data collection

We collected data on lifestyle, health status (physical, psychosocial) and background factors over the 3 months following hospital discharge. Figure 1 shows the data collection methods.

#### 1) Lifestyle

To clarify the lifestyle of patients with ALD, we created a structured interview guide and conducted structured interviews at 3 time points (namely at 1, 2 and 3 months after discharge or at readmission). This interview guide was based on the 5 categories associated with the lifestyle of patients with ALD, who were readmitted, that we obtained from retrospective research (dietary intake, alcohol consumption or abstinence, psycho-emotional status, regularity of life habits, and adherence to treatment) (23). Each category was composed of 2 grades, with each grade including levels 1 to 3. Table 1 describes these grades and levels.

#### 2) Health status (physical, psychosocial)

At 4 time points (at discharge and at 1, 2, 3 months after discharge or at readmission), we examined participants' medical records and conducted questionnaire-based surveys. Regarding physical condition, data on body mass index (BMI) and liver functions (albumin, ammonia, gamma-glutamyl transpeptidase, etc.) were collected from medical records. To collect data on their psychosocial conditions, questionnaire surveys on mood and quality of life (QOL) were conducted. The Profile of Mood States – Brief Japanese Version (POMS) (30) was used to survey mood. This questionnaire is composed of 30 items intended to capture a person's recent persistent mood states. Scores for 6 mood scales are calculated. Low scores on the vigor scale indicate a greater loss of vigor, while, for the other scales, higher scores indicate stronger moods. The coefficients of reliability (Cronbach's alpha) for the 6 scales are 0.57 to 0.88, verifying their reliability (30).

For QOL, the Short-Form 8 Health Survey (Japanese version) (SF-8) (8) standard edition (1 month) was used. This evaluates health-related QOL over the past month using 8 subscales. Scores for the 8 subscales are used to calculate 2 summary component scores (physical, mental) to examine the subject's health condition. The coefficients of reliability for these summary scores are 0.73 to 0.78, verifying their reliability (8).

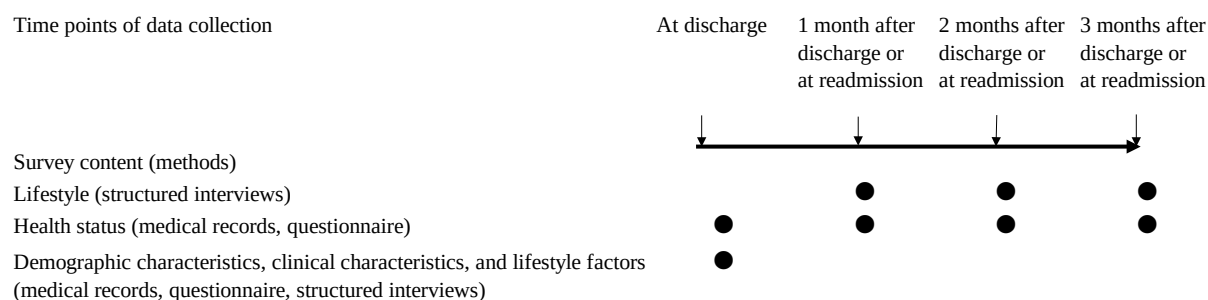
#### 3) Background factors

At discharge, we gathered data on demographic characteristics (age, marital status, family structure, employment status, education level, health insurance) and clinical characteristics (disease type, ascites, comorbidities, past history, alcohol dependence, age when started drinking, history of excessive drinking, current smoking habit) from medical records. The Alcohol Use Disorders Identification Test (AUDIT) (13) was used to

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survey the level of alcohol dependence. The AUDIT questionnaire contained ten items assessing three key aspects, namely alcohol consumption (items 1–3), alcohol dependence (items 4–6), and alcohol-related consequences (items 7–10). Responses to the first eight items were scored on a 5-point scale (values ranging from 0–4 points), while responses to the last two items were scored on a 3-point scale (values of 0, 2, and 4 points). The total score ranged from 0–40 points. Cronbach’s alpha values and item-total correlations for this test are known to be above 0.80 (1, 13).

Structured interviews on lifestyle-related factors were conducted at 3 time points (1, 2 and 3 months after discharge or at readmission). Factors related to psycho-emotional status were surveyed by asking about past life events.



**Figure 1.** Data collection

**Table 1.** The structured interview guide for assessing lifestyle in patients with alcoholic liver disease

| Categories                        | Grades                        | Levels                           | Definition                                                                                                                                                                                                           |
|-----------------------------------|-------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dietary intake                    | Irregular eating habits       | Unable to eat                    | Cannot eat the required amount 3 times per day even at mealtimes (for example, reduced number of meals or food intake)                                                                                               |
|                                   |                               | Decreased with drinking increase | Dietary intake decreases along with an increase in alcohol consumption (for example, only eating snacks or side dishes when drinking, missing meals when drinking, persistently missing meals as drinking increases) |
|                                   |                               | Excessive and unbalanced         | Eating excessively or a poorly balanced diet whether drinking or not (for example, increased number of meals, increased food intake, excessive consumption of snacks and side dishes)                                |
|                                   | Regular eating habits         | As appropriately as possible     | Eats during mealtimes, even if only a little                                                                                                                                                                         |
|                                   |                               | Appropriate                      | Eats the required amount 3 times per day at mealtimes                                                                                                                                                                |
| Alcohol consumption or abstinence | Alcohol consumption           | Uncontrolled                     | Increased alcohol intake and inability to carry out everyday behaviors (for example, bathing, shopping, cooking, medication management)                                                                              |
|                                   |                               | Controlled                       | Alcohol consumption controlled so everyday life can go on as usual                                                                                                                                                   |
|                                   | Abstinence                    | Abstinence                       | Maintaining abstinence from alcohol                                                                                                                                                                                  |
| Psycho-emotional status           | Feeling of abandonment        | Feeling of abandonment           | Unstable moods (for example, anxiety, irritability, depression, loneliness, anger), feelings of abandonment                                                                                                          |
|                                   | Calm                          | Calm                             | Moods are stable, has peace of mind                                                                                                                                                                                  |
| Regularity of life habits         | Irregular                     | No attention to timing           | Unconcerned with time (for example, time for meals, alcohol consumption, going to bed, waking up, taking medication)                                                                                                 |
|                                   | Regular                       | Attention to timing              | Concerned with time                                                                                                                                                                                                  |
| Adherence to treatment            | Discontinued taking treatment | Discontinued taking treatment    | Has not continued to take medication or undergo regular examinations (for example, not taking medication, taking too much medication, not going to examinations)                                                     |
|                                   | Continued taking treatment    | Continued taking treatment       | Has continued to take medication and undergo regular examinations                                                                                                                                                    |

### Data analysis

In this study, we used the conceptually clustered matrix by Miles *et al.* (19) to identify lifestyle habits leading to hospital readmission in patients with ALD. A conceptually clustered matrix is a method for organizing condensed qualitative data. This is most helpful when some clear concepts guide the initial analysis, and can be used with less complex cases, such as small groups. Matrix analysis includes steps to help ensure credibility, transferability, dependability, and confirmability of findings (16, 19, 31).

All patients, who were monitored after discharge were separated into 2 groups (the readmission group and the at-home recovery (at-home) group), and a conceptual cluster matrix was created for each group. In this matrix, the aforementioned 5 categories of the lifestyle of patients with ALD were the rows and the patients were the columns. The category levels (Table 1) obtained from structured interviews were entered into the cells of the matrices. The matrices of the readmission and at-home groups were analyzed as follows to investigate the characteristics of each group's lifestyle. First, the patients were arranged within each category (worst level first), then the number of patients in each level was counted. Next, median and range values were calculated for the health conditions (physical, psychosocial) of each group. Lifestyle characteristics were compared between the readmission and at-home group. Finally, median and range values were calculated for the demographic characteristics, clinical characteristics, lifestyle-related factors, age, and AUDIT scores, and for the other factors, the number of patients was counted which were compared between the two groups. In the statistical analysis, Fisher's exact test was used to evaluate qualitative data and the Mann-Whitney U test was used to evaluate quantitative data. The significance level was set at 5%. IBM SPSS Statistics version 22 was used for the analyses.

### Ethical consideration

This study was approved by the research ethics committee of Kobe University Graduate School of Health Sciences (approval number: 273) and was conducted according to the Declaration of Helsinki. All participants received oral and written explanations of the study. They were also told that participation in the study was at their own free will and accord, that they could rescind their consent at any time, without prejudice, that their identity would be kept anonymous, and that their personal information would be protected. All participants enrolled into the study provided consent.

## RESULTS

Of the 44 eligible patients, 37 agreed to participate in the study. After eliminating patients who died over the 3-month period of follow-up and those who discharged themselves without medical consent, 34 patients remained and were enrolled into the study. Figure 2 shows the flow diagram of patient recruitment and follow-up. Follow-up was performed on 21 patients at 1 month after discharge, on 11 patients at 2 months, and 8 patients at 3 months. Thirteen patients did not return for examination at 1-month after discharge and were lost to follow-up. Therefore, the analysis included the 21 patients who completed the 1-month follow-up after hospital discharge.

### Demographic characteristics, clinical characteristics, and background factors related to hospital readmission of patients with ALD

Of the 21 participants entered into the analysis, 7 were readmitted within 1 month after hospital discharge, with the other 14 patients continuing with at-home recovery. Patients' demographic characteristics, clinical characteristics, and lifestyle characteristics are summarized in Table 2. The median age of the study group was 61 years. Most patients lived alone and were unemployed. The disease type was alcoholic liver cirrhosis in 12 patients (Child-Pugh grade A, 5 patients; grade B, 5 patients; and grade C, 2 patients), clinical ALD in 5 patients, and alcoholic fatty liver in 4 patients. Most of patients had started drinking before the age of 20 years, had a history of excessive alcohol consumption, and had smoking habits.

The median age of the readmission group was 55 years, which is younger than the median age of 63 years for the at-home group. Four patients with alcoholic cirrhosis were in the readmission group (Child-Pugh grade B, 3 patients; and grade C, 1 patient), with this proportion being comparable to the at-home group.

An experience of loss in the past year was a background factor associated with hospital readmission among the ALD patients. In the readmission group, 5 of the 7 patients had experienced a loss, compared to 2 of 14 patients in the at-home group, which is a significantly higher proportion ( $p=0.017$ ) than those patients who had not experienced a loss in the past year. Specific experiences of loss included the death of a spouse, mother, or friend, as well as loss of a job. Correlations were not observed for any other background factors.

### Patients' lifestyle and health status at 1 month after hospital discharge

Of the 21 patients included in our analysis, 7 patients were in the readmission group and 14 in the at-home group. Table 3 summarizes the lifestyle (dietary intake, alcohol consumption or abstinence, psycho-emotional status, regularity of life habits, and adherence to treatment) and health status (physical, psychosocial), 1 month after discharge.

Regarding dietary intake, 5 of the 7 patients in the readmission group had irregular eating habits. The proportion of patients with irregular eating habits was significantly higher in the readmission than the at-home group in which only 1 of the 14 patients had irregular eating habits ( $p=0.006$ ). In the at-home group, the regular eating habits of 10 patients included eating something at mealtimes, even if just a small amount.

Regarding alcohol consumption or abstinence, 4 of the 7 patients in the readmission group continued to consume alcohol. While 11 of the 14 patients in the at-home group were drinkers, the difference between the groups was not significant. Further, among patients in the at-home group who were drinking, 10 patients controlled the amount they drank to allow them to maintain their usual daily life.

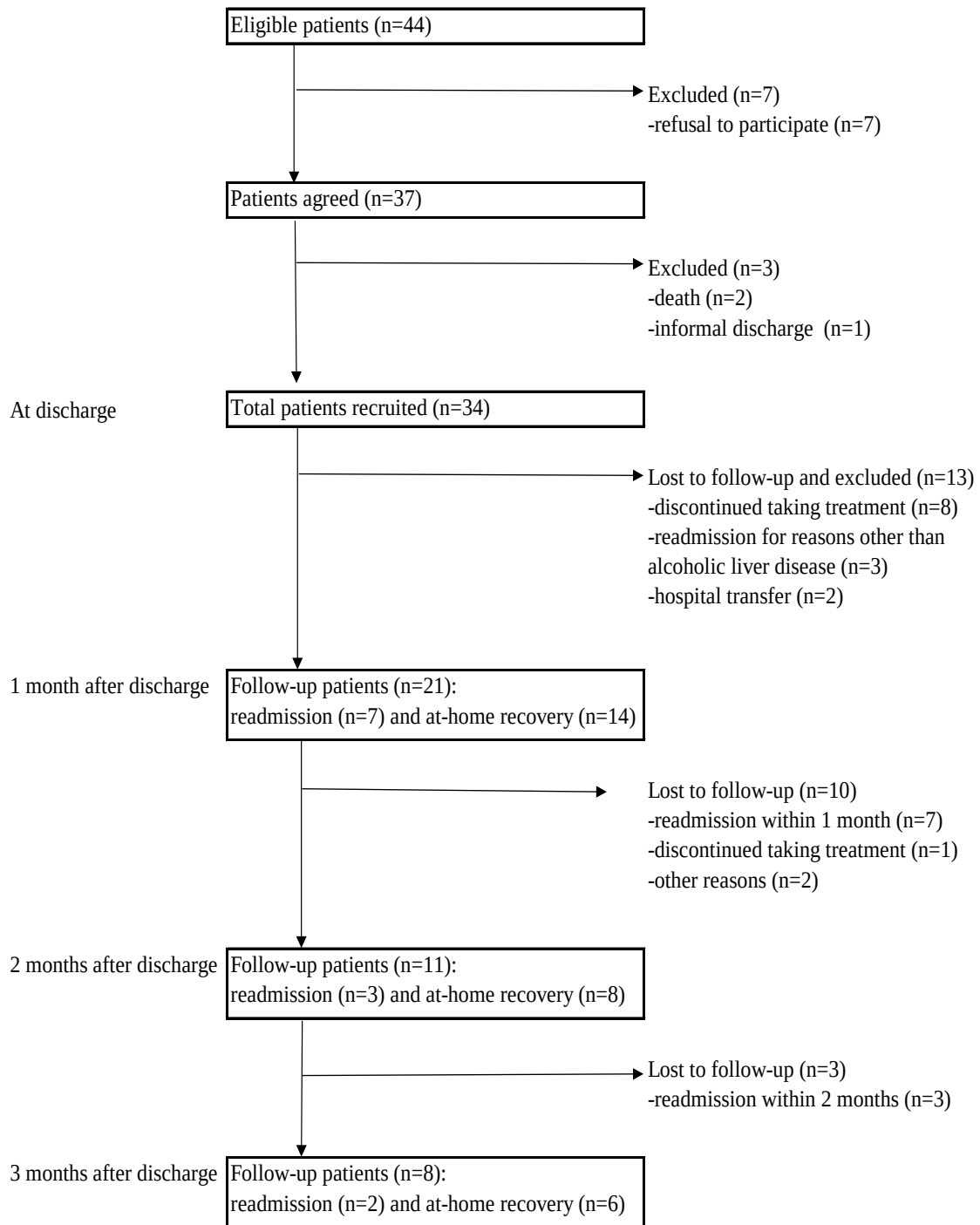
Regarding psycho-emotional status, 2 of the 7 patients in the readmission group had unstable moods (grade: feelings of abandonment), with the other 5 reporting a stable mood and peace of mind. By comparison, 6 of the 14 patients had unstable moods (grade: feelings of abandonment); however, this did not reach statistical significance.

Regarding the regularity of life habits, 3 of the 7 patients in the readmission group were in the irregular grade, while 4 were in the regular grade. In contrast, only 2 of the 14 patients in the at-home group had irregular life habits. Compared to the at-home group, more patients in the readmission group became unconcerned with times for meals, alcohol consumption, going to bed, waking up, taking medication, and other activities, causing their life habits to become irregular. However, the difference was not significant. The patients who were readmitted not only included those with irregular meal and medication times, but also those who went to bed or woke up at irregular hours.

Regarding and adherence to treatment, 2 of the 7 patients in the readmission group had discontinued drug and other treatments. In the at-home group, in which only, 3 of 14 patients had discontinued their treatment. Among patients readmitted, some discontinued drug treatment after a period of taking their medication at irregular times.

Regarding health status, the albumin level of the readmission group patients was 3.2 g/dl, on median, which was 3.8 g/dl level in the at-home group. Regarding mood, the readmission group scored higher than the at-home group on most of the psychosocial POMS scales, including anger-hostility and fatigue, though the difference was not significant. For QOL, the readmission group had a median score of 37.8 on the SF-8 physical component summary (PCS) scores, which is the median score of 38.5 points in the at-home group. Patients in the readmission group were readmitted, on median, 11 days after hospital discharge for various reasons, including ascites and hepatic encephalopathy.

Overall, although patients who continued at-home recovery did return to consuming alcohol, they were able to maintain a regular lifestyle, including regular eating habits and the continuation of treatment. Specifically, they concerned themselves with time, ate the required amount at mealtime, 3 times per day, controlled their drinking as to maintain their everyday life, and continued taking their medication and adhered to their schedule of regular examinations. In contrast, the lifestyle of patients who were readmitted to hospital was characterized by irregular eating habits and by the development of irregular life habits or the discontinuation of treatment, very quickly after hospital discharge. Regarding their health status, patients in the readmission group physically exhibited abnormal albumin and ammonia levels, and psychosocially had poor scores for POMS fatigue and SF-8 PCS. In addition, many patients in the readmission group had experienced a loss.



**Figure 2.** Flow diagram of recruitment and follow-up

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**Table 2.** Patients' demographic characteristics, clinical characteristics, and background factors related to hospital readmission among all patients with alcoholic liver disease (n = 21)

|                                           |                           |                | Total (n = 21) | Hospital readmission group (n = 7) | At-home recovery group (n = 14) | p value           |
|-------------------------------------------|---------------------------|----------------|----------------|------------------------------------|---------------------------------|-------------------|
| <b>Demographic characteristics</b>        |                           |                |                |                                    |                                 |                   |
| Age (years)                               |                           | Median (range) | 61 (38-79)     | 55 (38-73)                         | 63 (42-79)                      | .360 <sup>b</sup> |
| Marital status                            | Single                    | n              | 9              | 3                                  | 6                               | .676 <sup>a</sup> |
|                                           | Married                   | n              | 5              | 3                                  | 2                               | .182 <sup>a</sup> |
|                                           | Divorced                  | n              | 5              | 0                                  | 5                               | .098 <sup>a</sup> |
|                                           | Bereaved                  | n              | 2              | 1                                  | 1                               | .567 <sup>a</sup> |
| Living arrangement                        | Alone                     | n              | 14             | 4                                  | 10                              | .428 <sup>a</sup> |
| Occupation status                         | Currently unemployed      | n              | 17             | 6                                  | 11                              | .593 <sup>a</sup> |
| Education level                           | ≤Junior high school       | n              | 13             | 5                                  | 8                               | .443 <sup>a</sup> |
| Medical insurance                         | Public assistance         | n              | 11             | 3                                  | 8                               | .438 <sup>a</sup> |
| <b>Clinical characteristics</b>           |                           |                |                |                                    |                                 |                   |
| Type of disease                           | Cirrhosis                 | n              | 12             | 4                                  | 8                               | .681 <sup>a</sup> |
|                                           | Child-Pugh classification | Grade A        | n              | 5                                  | 0                               | .098 <sup>a</sup> |
|                                           |                           | Grade B        | n              | 5                                  | 3                               | .182 <sup>a</sup> |
|                                           |                           | Grade C        | n              | 2                                  | 1                               | .567 <sup>a</sup> |
|                                           | Clinical ALD              | n              | 5              | 2                                  | 3                               | .557 <sup>a</sup> |
|                                           | Fatty liver               | n              | 4              | 1                                  | 3                               | .593 <sup>a</sup> |
| Ascites                                   | Yes                       | n              | 5              | 2                                  | 3                               | .557 <sup>a</sup> |
|                                           | Type II diabetes          | n              | 4              | 3                                  | 1                               | .088 <sup>a</sup> |
|                                           | Obesity                   | n              | 3              | 1                                  | 2                               | .726 <sup>a</sup> |
| Comorbidity                               | Hypertension              | n              | 2              | 2                                  | 0                               | .100 <sup>a</sup> |
|                                           | Dyslipidemia              | n              | 2              | 1                                  | 1                               | .567 <sup>a</sup> |
|                                           | Depression                | n              | 2              | 1                                  | 1                               | .567 <sup>a</sup> |
|                                           | Fracture                  | n              | 2              | 0                                  | 2                               | .433 <sup>a</sup> |
| Medical history                           | Alcoholism                | n              | 9              | 4                                  | 5                               | .319 <sup>a</sup> |
| AUDIT score (points)                      |                           | Median (range) | 24 (0-38)      | 25 (18-38)                         | 23 (0-32)                       | .255 <sup>b</sup> |
| Age of starting drinking                  | <20 years                 | n              | 19             | 5                                  | 14                              | .100 <sup>a</sup> |
| Experienced past excessive drinking       | Yes                       | n              | 16             | 7                                  | 9                               | .098 <sup>a</sup> |
| Smoking                                   | Current smoker            | n              | 13             | 5                                  | 8                               | .443 <sup>a</sup> |
| <b>Lifestyle factor</b>                   |                           |                |                |                                    |                                 |                   |
| Experienced loss within the previous year | Yes                       | n              | 7              | 5                                  | 2                               | .017 <sup>a</sup> |

Note. n = number; ALD = Alcoholic liver disease; AUDIT = Alcohol Use Disorders Identification Test.

a: Fisher's exact test b: Mann-Whitney U test

**Table 3.** Lifestyle and health status at one-month after discharge in patients with alcoholic liver disease (n = 21)

|                      |                                      | Hospital readmission group (n = 7)           |                                 | At-home recovery group (n = 14)    |          | p value           |
|----------------------|--------------------------------------|----------------------------------------------|---------------------------------|------------------------------------|----------|-------------------|
| Lifestyle            | Categories                           | Grades : Levels                              |                                 | Grades : Levels                    |          |                   |
|                      | Dietary intake                       | Irregular eating habits (n = 5)              |                                 | Irregular eating habits (n = 1)    |          | .006 <sup>a</sup> |
|                      |                                      | : unable to eat                              | (n = 2)                         | : unable to eat                    | (n = 0)  |                   |
|                      |                                      | : decreased with drinking increase           | (n = 2)                         | : decreased with drinking increase | (n = 1)  |                   |
|                      |                                      | : excessive and unbalanced                   | (n = 1)                         | : excessive and unbalanced         | (n = 0)  |                   |
|                      |                                      | Regular eating habits (n = 2)                |                                 | Regular eating habits (n = 13)     |          |                   |
|                      |                                      | : as appropriately as possible               | (n = 0)                         | : as appropriately as possible     | (n = 10) |                   |
|                      |                                      | : appropriate                                | (n = 2)                         | : appropriate                      | (n = 3)  |                   |
|                      | Alcohol consumption or abstinence    | Alcohol consumption (n = 4)                  |                                 | Alcohol consumption (n = 11)       |          | .299 <sup>a</sup> |
|                      |                                      | : uncontrolled                               | (n = 1)                         | : uncontrolled                     | (n = 1)  |                   |
|                      |                                      | : controlled                                 | (n = 3)                         | : controlled                       | (n = 10) |                   |
|                      |                                      | Abstinence (n = 3)                           |                                 | Abstinence (n = 3)                 |          |                   |
|                      | Psycho-emotional status              | Feeling of abandonment (n = 2)               |                                 | Feeling of abandonment (n = 6)     |          | .443 <sup>a</sup> |
|                      |                                      | Calm (n = 5)                                 |                                 | Calm (n = 8)                       |          |                   |
|                      | Regularity of life habits            | Irregular (n = 3)                            |                                 | Irregular (n = 2)                  |          | .182 <sup>a</sup> |
|                      |                                      | : no attention to timing                     | (n = 3)                         | : no attention to timing           | (n = 2)  |                   |
|                      |                                      | Regular (n = 4)                              |                                 | Regular (n = 12)                   |          |                   |
|                      |                                      | : attention to timing                        | (n = 4)                         | : attention to timing              | (n = 12) |                   |
|                      | Adherence to treatment               | Discontinued treatment (n = 2)               |                                 | Discontinued treatment (n = 3)     |          | .407 <sup>a</sup> |
|                      |                                      | Continued treatment (n = 5)                  |                                 | Continued treatment (n = 11)       |          |                   |
| Health status        | Physical condition                   |                                              |                                 |                                    |          |                   |
|                      | Body mass index (kg/m <sup>2</sup> ) | Median (range)                               | 23.4 (21.1-25.8)                | 21.8 (16.1-30.0)                   |          | .149 <sup>b</sup> |
|                      | Albumin (g/dl)                       | Median (range)                               | 3.2 (2.1-4.6)                   | 3.8 (3.0-5.0)                      |          | .560 <sup>b</sup> |
|                      | Ammoniae (mg/dl)                     | Median (range)                               | 233 (80-578)                    | Data unavailable                   |          |                   |
|                      | Gamma-glutamyl transpeptidase (IU/L) | Median (range)                               | 66 (15-1296)                    | 83 (15-897)                        |          | .585 <sup>b</sup> |
|                      | Psychosocial condition               |                                              |                                 |                                    |          |                   |
|                      | POMS score (points)                  | T-A                                          | Median (range) 57 (44-69)       | 53.5 (32-68)                       |          | .488 <sup>b</sup> |
|                      |                                      | D                                            | Median (range) 58 (53-85)       | 56.5 (40-85)                       |          | .287 <sup>b</sup> |
|                      |                                      | A-H                                          | Median (range) 60 (39-78)       | 46.5 (36-75)                       |          | .172 <sup>b</sup> |
|                      |                                      | V                                            | Median (range) 42 (28-55)       | 38 (27-51)                         |          | .172 <sup>b</sup> |
|                      |                                      | F                                            | Median (range) 68 (52-78)       | 55 (41-78)                         |          | .128 <sup>b</sup> |
|                      |                                      | C                                            | Median (range) 59 (31-85)       | 61.5 (42-82)                       |          | .636 <sup>b</sup> |
|                      | SF-8 score (points)                  | PCS                                          | Median (range) 37.6 (22.3-49.5) | 38.5 (25.7-48.1)                   |          | .689 <sup>b</sup> |
|                      |                                      | MCS                                          | Median (range) 46.4 (28.1-54.5) | 44.0 (27.7-54.0)                   |          | .443 <sup>b</sup> |
| Hospital readmission | Time to hospital readmission (days)  | Median (range) 11 (7-29)                     |                                 | Not applicable                     |          |                   |
|                      | Reason of hospital readmission       | eg: Ascites, Hepatic encephalopathv, fatigue |                                 | Not applicable                     |          |                   |

Note. n = number; POMS = Profile of Mood States-Brief Japanese Version; T-A = Tension-Anxiety; D = Depression-Dejection; A-H = Anger-Hostility; V = Vigor; F = Fatigue; C = Confusion; SF-8 = Short-Form 8 Health Survey (Japanese version); PCS = physical component summary; MCS = mental component summary.

a: Fisher's exact test b: Mann-Whitney U test

## DISCUSSION

In this study, we identified that irregular eating habits, which develops early (few weeks) after discharge, is a predisposing factor for readmission of patients with ALD. These patients were unable to maintain regular life habits or comply with treatment, and had often experienced a history of loss. While many patients who continued at-home recovery did resume their alcohol consumption, these patients were able to maintain their regular life habits, to eat sufficiently, and to adhere to their treatment.

Conventionally, therapy for ALD patients has basically consisted of abstaining from alcohol, nutritional supplementation, and pharmacotherapy, with abstinence seen as an essential part of support for preventing the exacerbation of ALD. Brief interventions, nutritional support, and medication management have been shown to have positive effects on reducing alcohol consumption (21, 25). In the present study, the comparison of the lifestyles of patients, who were readmitted to the hospital and those who were able to continue at-home recovery, showed a significant difference in the regularity of eating habits but not in alcohol consumption or abstinence. These results indicate that support for ALD patients in the early stages after being discharged from the hospital should emphasize helping them maintain regular eating habits, rather than the conventional focus on abstinence. The importance of regular eating habits is apparent in the fact that the circadian rhythm affects nutrition and metabolism, and that regular eating habits have a direct impact on hepatic diurnal rhythm, which is said to play important roles in the regularity and homeostasis of metabolic functions (2). For patients with ALD associated with metabolic dysfunctions, irregular eating habits may reduce hepatic nutritional and metabolic functions quickly after hospital discharge, leading to readmission for ascites or hepatic encephalopathy. Moreover, there is a rhythm to the metabolism of drugs by the liver, with the importance of taking medication at the prescribed times having been reported (18). When mealtimes become irregular, medication taken with meals is also taken irregularly. Moreover, continually missing meals can lead to discontinuation of medication. Taking medication at irregular times may impact drug metabolism by the liver and non-adherence may reduce the therapeutic effects of drugs, which could cause a worsening of ALD. In healthy people, the rhythms of the liver and other digestive organs are aligned with the cycle of light and dark; therefore, irregular sleep can disrupt the circadian rhythm of the liver and digestive organs, which might have a negative impact on metabolism (2, 4). Irregular eating habits also have an indirect impact on the sleep-wake cycle, which can make it difficult to maintain regular life habits overall. In other words, if patients with ALD can pay attention to time throughout the day and maintain regular eating habits, it would help them to adhere to appropriate self-management behaviors, such as regular life habits and complying with drug therapy, which will likely help them avoid readmission over the short-term.

Experiences of loss were among the background factors of patients with ALD who were readmitted. Most patients with ALD experienced this loss within the previous year, such as the death of a spouse or loss of a job. Specifically, these patients had lost important individual or social support that had helped them maintain regular life habits and self-management behavior related to their recovery from ALD. There have been almost no studies of the psychosocial factors of ALD patients who are readmitted to the hospital. We were able to find only one recent study on alcoholic hepatitis patients, which found that readmission correlated with age and type of public medical insurance (15). In the present study, experience of loss was the only background factor that significantly correlated with readmission, which suggests that focusing on ALD patients' experiences of loss is important to avoiding readmission in the short-term. Loss of a spouse is one of the most stressful life events (11), and the process of grieving can cause strong feelings of loneliness, protracted mourning, and serious health problems (22). Social stressors, including those that occurred within the prior 3 to 6 months, can cause adverse health outcomes (24), with emotional eating habits having been found to lead to feelings of a loss of control (17). Patients with ALD who are unable to adapt to life changes after a loss, are likely to experience reduced appetite, due loneliness or grief, which can lead to irregular eating habits. If no one is available to cook, it is harder to eat at regular meal times, which can hinder establishing regular eating habits. Cumulation of these diet-related difficulties can result in the irregular eating habits of patients with ALD that are at risk for readmission. The loss of a connection to one's social network can lead to a loss of a reason to pay attention to time. Therefore, if patients with ALD find it difficult to maintain regular life habits after discharge from the hospital, they may stop complying with things, such as regular meals, taking medication, and receiving treatment.

### **Suggestions for nursing practice**

Nursing care for patients with ALD should support them in maintaining effective self-management behaviors to lower the risk of readmission. Previous research on outpatient support for patients with cirrhosis indicated that adherence to drug therapy and other self-management behavior helps to avoid readmission (29). The results of our study indicate that support focused on the regularity of eating habits is important would be an important focus of nursing care for patients with ALD. This is because regular eating habits establish a circadian rhythm that is important to maintain and improve the nutritional and metabolic functions of the liver, which may prevent

readmission over the short-term. To establish regular eating habits, patients with ALD need to eat regularly every day, paying attention to time, amid their post-discharge social lives.

The results of the present study also indicated that for patients with ALD, the experience of loss not only causes loneliness but can easily lead to irregular eating and life habits, due to the absence of a person who was providing support. Therefore, before patients leave the hospital, nurses need to understand their living environment, propose ways of using community resources, and coordinate with relevant organizations (for example, regular meal deliveries, having home-visit nurses cook, having home-visit nurses manage medication). Telephone interventions for patients with chronic diseases are said to be effective in improving drug adherence and other forms of self-management by providing reminders (6). For patients with ALD in particular, it is important for nurses to call patients in the early stages after discharge (first week) to check whether they are paying attention to time, eating regularly, and continuing to take their daily medication. If patients are unconcerned with time and not eating or taking medication regularly, they should be asked whether a loss is the reason for this and quickly be provided with support to establish regular life habits. For lonely patients, phone consultations with nurses can be a valuable form of emotional support by calming and reassuring them while making them feel they are connected to society.

### Limitations and future topics

This was a prospective study of patients with ALD over the 3 months after being discharged from a specialized liver hospital, but only included 21 patients. One reason for this is that 8 of the patients who were recruited discontinued treatments, which is a high number. However, the use of conceptual cluster matrices, a method of summarizing qualitative data, enabled us to clarify the lifestyle characteristics of patients with ALD who were readmitted to the hospital. Going forward, we would like to investigate protocols to help patients with ALD maintain regular life habits after leaving the hospital. Quantitative examination of the efficacy of using these protocols to help ALD patients avoid rapid hospital readmission would also be necessary.

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